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INVESTIGATION OF TIDAL POWER

COBSCOOK BAY, MAINE



CORRESPONDENCE /
PUBLIC INVOLVEMENT



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AUGUST 1980

INVESTIGATION OF TIDAL POWER
COBSCOOK BAY, MAINE :

APPENDIX

CORRESPONDENCE - PUBLIC INVOLVEMENT

FORWARD

Public involvement in this study was rather intensive in 1978 when it was felt that this study would be completed within three years and that definitive answers would result. In July 1978 public meetings were held at Eastport, August and Lubec. In September 1978 a Record of Initial Public Meetings for the Tidal Power Study, Cobscook Bay, Maine, USA was published. Due to its size, that record is not included in this appendix. It is available through the New England Division's Technical Library for inter-library loan. In August 1978 a brief report presenting summaries of five workshops held in May and June of 1978 was released. This report is included in the appendix.

With the release of the March 1979 Economic report, the future course of the study became unclear; and since then, there has been a lull in public involvement activities. However, in November 1979 a Symposium on Relative Price Shift Analysis as Applied to Public Power Projects was held at Portland, Maine. A report on the Symposium has been prepared and copies of that report can be obtained by writing to:

Division Engineer
U.S. Army Engineer Division, New England
424 Trapelo Road
Waltham, Massachusetts 02254

This appendix presents pertinent correspondence which has occurred since this study was initiated in 1975 as well as some public views as expressed in workshops and newspapers. The intent of this document is to familiarize the reader with recent activities and communications associated with the tidal power study.

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United States Senate

COMMITTEE ON PUBLIC WORKS

COMMITTEE RESOLUTION

RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE,

That the Board of Engineers for Rivers and Harbors, created under the provisions of Section 3 of the Rivers and Harbors Act approved June 13, 1902, be, and is hereby, requested to review the report on Passamaquoddy-St. John River Basin Power Project, Maine transmitted to Congress by the President of the United States on July 12, 1965 published as House Document No. 236, 89th Congress, and other pertinent reports, with a view to determining the current feasibility, taking full advantage of the latest technological advances, of the Passamaquoddy Tidal Power Project in the interest of providing tidal power, recreation, economic development and related land and water resources purposes.

March 21, 1975

Adopted:

Jennings Randolph
Jennings Randolph, Chairman.

(At the request of Edmund S. Muskie, Senator from Maine)



JAMES S. LONGLEY
GOVERNOR

STATE OF MAINE
OFFICE OF THE GOVERNOR
AUGUSTA, MAINE
04800

September 7, 1976

John Leslie
U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Leslie:

I realize the Federal government is studying tidal power to determine its feasibility, especially in Passamaquoddy Bay.

We are of the opinion that, in order for these studies to be worth the taxpayer dollars being spent on them, that they must include a per kWh life cycle cost analysis of the proposed Quoddy project and a comparison of the projected cost of the alternatives (nuclear, coal, oil-fired and river hydro) ten or twenty years from now, when the next large scale generating facilities will actually be needed.

We are greatly disturbed that neither the Corps of Engineers nor ERDA has seen fit to include this type of cost projection in the scope of work to be performed by the Stone and Webster Company, although Mr. Wayne has publicly recognized that if Quoddy had been built years ago its power would be a bargain today.

We feel no one is going to be enlightened by a study which quantifies the obvious, namely that Quoddy will cost more to build now than 20 years ago, or that it will cost more to build than some other type of facility. What we need to know from a power-cost standpoint is the value of Quoddy in ten or twenty years with the fuel costs of other types of power rising? We also would like to know from an overall public investment standpoint, what would be the external benefits of the project to the affected region, which is characterized by its remoteness, coldness, low-incomes and high energy costs?

Until your studies attempt to answer these questions in a preliminary fashion, we must conclude that they are not only worthless as a planning tool, but may actually produce

September 7, 1976

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'prejudices which would forever condemn the Quoddy project as "economically unfeasible" and thus deprive the State and the Nation of our best hope for a tidal project.

We feel that it is feasible for you to make the projections we have described within the terms and budgets of your current contracts, and look forward to a letter from you stating that you have indeed decided to do so.

Very truly yours,


JAMES B. LONGLEY
Governor

JBL/gwd

cc: Abbie Page, Director, Office of Energy Resources
Allen Pease, Director, State Planning Office



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED-E

31 May 1977

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

HQDA(DAEN-CWP)
WASH DC 20314

1. References:

a. Resolution adopted on 21 March 1975 by the Committee on Public Works, United States Senate, as sponsored by Edmund S. Muskie, Senator from Maine.

b. Public Law 94-180, Public Works Appropriations Act for FY 1976, approved on 26 December 1975, which authorized funds for subject study.

c. Letter dated 7 September 1976 from Honorable James B. Longley, Governor of Maine, recommending that a life-cycle costing analysis of the tidal power project be accomplished.

d. OFPP Pamphlet No. 1, August 1976, titled "Major System Acquisitions - A Discussion of the Application of OMB Circular No. A-109," and OMB Circular No. A-109 dated 5 April 1976 which pertains to life-cycle costing.

e. Checkpoint type meeting held in NED on 7 April 1977 during which Messrs. Baltis, Reisler and Shwaiko from Office, Chief of Engineers met with personnel of this Division to discuss the project in general.

2. Attached is copy of draft report prepared by this Division titled: "Economic Feasibility Study for International Passamaquoddy Tidal Power Project, Cobscook and Passamaquoddy Bays, Maine and New Brunswick" dated 20 November 1976; and Supplement thereto dated 30 April 1977. It is noted that this letter is not requesting a technical type review of the draft report as such but to briefly inform you of the economic feasibility of the International and All-American tidal power plans and our life-cycle analysis of the 500 MW International project. Also to request your office to review and make a decision on the applicability and appropriateness of life-cycle analysis as the economic basis for the project and to advise this Division on whether or not to proceed with further project study.

NEDED-E

31 May 1977

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

A separate letter dated 24 May 1977 has been forwarded to OCE, Attention DAEN-CWP-E requesting a technical type review of the report especially on the life-cycle presentation.

3. Prior to initiating a Plan of Study and full scale Survey Scope Study for subject International project, it was determined to first accomplish an economic feasibility study of the project based on updated benefits, costs and current conditions to determine if further study was warranted.

4. The tidal project is unique in principle and is considered special in that it is a one of a kind type project in the United States. As background, our task was to update construction, operations and maintenance costs and benefits of the 500 and 1,000 megawatt International Tidal Power Project as proposed in August 1964 by the Passamaquoddy - Saint John River Study Committee. This plan is basically the same as the 300 megawatt international project as proposed and presented by the International Passamaquoddy Engineering Board in October 1959 except for increased installed generating capacity. This updating task was completed in November 1976 and the economic evaluation by the conventional Benefit-Cost Ratio (BCR) method indicated that the project was not economically feasible as the BCR was less than unity. A brief summary is as follows:

<u>Passamaquoddy</u> <u>International Tidal Power Project</u>		
<u>Project Size</u>	<u>BCR with Power</u> <u>Benefits Only</u>	<u>BCR with Power</u> <u>and Ancillary Benefits*</u>
500 MW	.53	.74
1000 MW	.49	.67

* Includes area redevelopment, fisheries and recreation.

Based on a Total Investment Cost of \$1,775,254,000 for the 500 MW facility, the average cost per KW is \$3,551; and the 1000 MW plant is \$2,803/KW on a Total Investment Cost of \$2,802,751,000. These unit costs are very high when compared to other types of power alternatives. When analyzing the two projects from an energy production and cost viewpoint, the 500 MW facility is the more preferable and economical plan. The Total Investment Cost includes estimated Interest During Construction.

NEDED-E

31 May 1977

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

5. As the evaluation work for the international plan progressed, certain comments by state and other personnel mentioned that the 1935 tidal power project, if built and which was entirely within the boundaries of the United States, would be a "bargain" and possibly worthwhile under today's conditions. In view of this, this Division updated the costs and benefits of the original 1935 project for which construction was started but discontinued in 1936, plus other various single and double pool All-American tidal power concepts that were proposed in the 1934-1936 era. The general results of the economic study of these All-American projects when based on the conventional methods indicates a BCR range of .31 - .45 to 1.00 when only power is considered, and a BCR range of .55 - .77 to 1.00 when ancillary benefits are included. Likewise, the All-American concepts do not appear economically feasible by conventional analysis, and therefore further study does not appear warranted.

6. As noted in the report, the Honorable James B. Longley, Governor of Maine strongly suggested that the Passamaquoddy project be evaluated on a life-cycle basis, which in general takes into consideration escalation of replacements, operation, maintenance and fuel costs over the life span of the project. The Governor was advised that this was not the conventional dictated method of analysis as established by the Congress for the evaluation of water resource project, however, that this Division would develop a life-cycle study of the project for his information. The Federal Power Commission cooperated greatly and assisted this Division by furnishing power values over the 100 year life span of the project through the use of their computer program. The 500 MW international plan was selected for this analysis. The life-cycle analysis undertaken by the FPC and NED is a preliminary economic examination of the project by this method and is considered to be consistent with the preliminary stage of planning we are presently in. A thorough detailed analysis by life-cycle would require more in-depth work which would be performed at a later date if further study is decided upon. The results of our investigation of the project by life-cycle indicates that the project is economically feasible and worthwhile over the 100 year life span of the project.

Although the present initial estimated annual costs for the 500 MW tidal power project is \$121,121,000 per year and the selected combined cycle private alternative plant is \$55,316,000, the tidal power project will become cheaper to operate in about 20 years time. This is based on both projects being financed at 6 3/8% and an annual escalation rate of 5% and a 100 year life span. In our life-cycle studies only the power costs and power benefits were considered; area redevelopment, fisheries and recreation benefits were not introduced.

NEDED-E

31 May 1977

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

7. The NED life-cycle study did not evaluate any of the All-American concepts as in our coordination efforts with the ERDA study we stated we would evaluate the 500 MW international plan and ERDA would accomplish similar studies on some All-American plans. The ERDA study was based on changes in variable fuel costs only, a project life span of 50 years and an interest rate of 7%. Their general findings and conclusions on life-cycle costing in part are:

"The most important conclusion resulting from this study is that economic evaluations of any proposed tidal power project (or conventional hydro project) which would be built in lieu of a fossil fueled power plant should be based upon life-cycle cost analyses covering at least the economic life of the project. This is a vital concept which must be given careful consideration. The detailed economic analyses made as part of this study indicate that reasonably anticipated rises in the costs of fuel for alternative oil or coal fired steam electric plants would more than compensate for the initially high tidal plant investment costs.

The life-cycle cost analyses for a 180 MW single pool project M-3 in Cobscook Bay, plus pumped storage backup, result in levelized power costs of 122 mils./kwhr. A benefit/cost ratio of 1.0 would be achieved with either a 5.4 percent annual rise in oil costs or 5.9 percent annual rise in coal costs. The corresponding break-even points would occur in the 12th and 14th years of operation, respectively. The potential net savings in power costs over the 50 year period attributable to the tidal project would be as follows for the indicated rises in fuel costs:

<u>Alternate Fossil Plant</u>	<u>Net Savings in Million Dollars</u>		
	<u>4% Rise</u>	<u>5% Rise</u>	<u>6% Rise</u>
Oil Fired	424	2,481	5,616
Coal Fired	-221	980	2,934"

NOTE: If further study is commenced this Division will accomplish a life-cycle analysis of each All-American alternative.

8. Independent and separate tidal power studies by the Energy Research and Development Administration (ERDA) with Stone and Webster Engineering Corporation as the principal contractor, and the U. S. Congress Office of Technical Assessment (OTA), are both reporting that tidal power projects in the Passamaquoddy region are economically feasible when evaluated on the life-cycle basis. These agencies are recommending that the

NEDED-E

31 May 1977

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

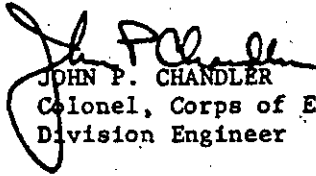
project be analyzed by this method. It is also noted the ERDA report agrees with the NED report that the project is not economically feasible when evaluated by the conventional BCR method. The ERDA report was completed in April 1977 and it is anticipated that the OTA report will be completed in June 1977.

9. In summary, based on the conventional BCR method of analysis, it does not appear that further study of the International or All-American tidal power plants is warranted. However, before a decision is made to cease study, the appraisal of the project by the life-cycle method of analysis indicates certain value and worth. With respect to utilizing the life-cycle method of analysis as the recognized basis for the economics of the project and further study (i.e. preparing a Plan of Study, addressing engineering, environmental concerns and public involvement for a Survey Scope Study), it is considered necessary to obtain your decision on the subject as it involves a major departure from present policy. In view of the changing times, energy situation (estimated annual savings of 2,700,000 BBLs of oil for the 500 MW project), escalation, views of other agencies, etc., the life-cycle costing appears to have merit and deserves consideration for evaluating and determining the future of this energy oriented water resource project.

10. If decision is made for this Division to proceed with the preparation of a Plan of Study, the next foreseeable critical issue is to determine whether the International or All-American tidal power project should be studied. This will first necessitate a meeting with the Canadians to obtain their formal views and position on a joint Quoddy project and study. If Canada indicates formal disinterest in the International project then it appears that this Division would be free to study the All-American tidal power plans. Presently this Division is attempting to obtain informal opinions on the tidal power project from The New Brunswick Electric Power Commission and expect to meet with their representatives during the mid-latter part of June 1977. Your office will be advised of the results of this meeting.

11. Your review comments and decision on the above and whether this Division should proceed with a Plan of Study for a Survey Scope Report are requested as soon as possible.

1 Incl (dupe)
As stated


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

DAEN-CWP

DAEN-CWP-P

11 July 1977
CGN/bz/57320

1. Purpose. The purpose of this DP is two-fold:

- a. To discuss generally the concept of life-cycle costing, including role of ILL.
- b. To review NED's application of life-cycle costing to the Passamaquoddy project (pp. 28-39 of "Supplement to Economic Feasibility Study . . . 4" dated April 1977).

2. General. A life cycle cost is the total cost of an item throughout its useful life including construction, operation, maintenance and disposal (see LCC Workbook, GSI, p. I-1).

3. Obviously, therefore a life cycle cost is in theory precisely what we mean when we use the word "cost" in a benefit-cost ratio. We take account of maintenance, operation, rehabilitation, disposal and all other items of cost.

4. Life-cycle costings varies from traditional (Corps) benefit-cost analysis in that it attempts to project unit-costs prices into the future. There are two reasons why unit costs might be expected to increase in the future:

- a. Inflation. Inflation must be carefully defined. Most economists define inflation as a general increase in the price of all items due to an expansion of the money supply. The effect of (general) inflation on Corps projects was amply demonstrated in our analysis of the Red River Waterway at the request of Senator Long. However, I (and most economists) do not credit such increases as economic gains. 1/ Instead such gains are financial only. The theory is that the exact same resources (man-hour, materials, equipment) must be used, whether the project is built now or later; i.e., with today's dollars or tomorrow.

- b. Shift in Relative Price. In this case one or more specific commodities rise in price relative to all other commodities. Specifically the price of one commodity increases by greater than the inflation rate. Most economists will credit such increases as economic gains. For example, if benefit x increases 10 percent a year while inflation is 7 percent a year, then 3 percent a year is an economic gain; 7 percent is financial.

5. Accordingly, the Principles and Standards (p. 85; Federal Register, 10 September 1973, p. 24821) permits accounting for relative price changes over time. However, the PLS generally discourage such projections and this is echoed in ER 1105-2-921, p. 9 ("Price levels will be those current at the time of the study . . .").

1/ As you know, I prefer to take inflation out of the discount rate, not put it in future prices.

6. The reason we have been reluctant to project relative prices is that it is difficult to accomplish in a creditable manner.

7. However, it may be time to reassess our reluctance in at least three areas:

a. Construction costs. Construction costs have been increasing, according to ENR, at a faster rate than general inflation (e.g., GNP deflator). This implies it is better to build sooner than later by the rate of ENR minus the rate of general inflation.

(1) CAVEAT: The other side of the sword is that we should increase our costs by the rate of relative price change to project year one.

b. Energy costs. The fuel costs for alternatives to hydropower may continue to rise relative to general inflation. In addition the Federal energy agencies have been projecting prices. Therefore, creditable shifts in prices may be obtainable. CAUTION: Pumped storage projects may suffer if fuel costs for pumping energy are permitted to rise.

c. Unique EQ. One source of relative price shifts is scarcity (or uniqueness) for which there is no substitute. Significant historical sites, wild rivers, etc. are unique and likely to become scarce. One of the problems in increasing the price of unique EQ is, of course, the lack of ability to obtain a current price to increase from.

8. Role of IWR. The basic role of IWR should be to determine whether or not we can project relative prices with credibility and confidence. A clear discussion of the available data is crucial. I have discussed this matter with A. J. Frederick and George Axtle and we should be receiving a proposal from them shortly.

9. Pasamaquoddy. It is impossible to tell how much of the life cycle analysis reflects general inflation versus relative price shifts in the cost of fuel for alternative modes. There are three possible reasons for the projected increase in alternative costs:

a. Relative price shifts in fuel inputs. This is a valid economic consideration.

b. Increases in construction costs of alternative plants due to inflation. This is valid according to most economists only insofar as construction inflation exceeds general inflation.

c. Impact of general inflation. This is not valid economically; it is merely financial.

At a minimum, the field should break the reasons for the increases out according to a-c above.

11. In summary, Pasamaquoddy should be redone to differentiate relative price shifts from general inflation.

DAEN-CWP-E (31 May 77) 1st Ind
SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

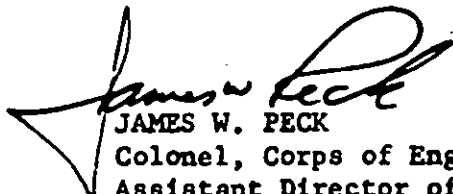
DA, Office of the Chief of Engineers, Wash D.C. 20314 28 SEP 1977

TO: Division Engineer, New England ATTN: NEDED-E

1. We concur in your recommendation to proceed with the Plan of Study for the subject project. The Principles and Standards permit the use of life-cycle costing to the extent of projecting relative prices; however, projecting of general inflation is not permitted. There are presently no specific guidelines on projecting relative prices; any such regulation would be subject to review, findings and rule-making by the Water Resources Council.
2. Since the BCR for the subject project is significantly less than unity utilizing conventional national economic efficiency benefits, you should proceed with caution in the life-cycle analysis. In addition to economic feasibility, you should determine financial feasibility through coordination with the appropriate marketing agency. If at any point it becomes apparent that you are unable to develop a feasible project, you should terminate the study and report excess funds for revocation.
3. Before proceeding further with detailed analysis, you should request a meeting with OCE to clarify issues and concepts. Arrangements for the meeting should be made with Mr. Edward Cohn, DAEN-CWP-P, telephone No. 202-693-7320. Inclosed as background for the meeting are comments and observations on the general life-cycle costing concept and on your preliminary life-cycle analysis for the subject project. The major issues are : (1) what elements of life-cycle analysis are theoretically valid; and (2) what elements of life-cycle analysis are amenable to credible and consistent measurement.

FOR THE CHIEF OF ENGINEERS:

1 Incl
as


JAMES W. PECK
Colonel, Corps of Engineers
Assistant Director of Civil Works,
Atlantic



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

INEDPL

7 April 1978

SUBJECT: Passamaquoddy Tidal Power Project ((CWIS #14023))

HQDA (DAEN-CWP-E)
WASH DC 20314

1. References ((copies attached)):

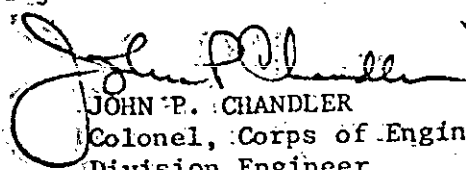
- a. NED letter file INEDPL dated 12 October 1977, subject as above to your office.
- b. OCE letter file DAEN-CWP-C, dated 7 December 1977 to Environmental Officer, Office of Canadian Affairs, Department of State.
- c. Dept. of State letter dated 13 December 1977, from U.S. Environmental Officer, Office of Canadian Affairs to Mr. George Rejohn, Counselor ((Environment)) Embassy of Canada.

2. This Division is in process of preparing a Plan of Study (POS) for subject study as well as a Public Participation Program. Presently, our full effort is being directed to an "All United States" tidal power plan which would be entirely within the State of Maine. In view of the fact that the region also offers the possibility for an International Plan, this Division requested your office to initiate correspondence with the State Department to inquire of Canada's interest in an international tidal power project in the Passamaquoddy region and their willingness to participate in a joint study with the United States.

3. To date this Division has not received any indication of Canada's interest and it is desired that OCE contact the State Department to determine status of the inquiry. Informally, it is our understanding that the State Department letter was misdirected to the appropriate Canadian office which might be causing response delays. It appears that the letter might have been better sent to representatives of the Department of Energy, Mines and Resources instead of Environment Canada.

4. Your early reply would be appreciated so as to assist this Division in determining the full study scope and funding requirements for inclusion in the Plan of Study. Presently, this Division will continue work with the view that the tidal project will be based on an "All-United States" plan.

3 Incls
as


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Canadian Embassy



Ambassade du Canada

1746 Massachusetts Ave. N.W.
WASHINGTON, D.C. 20036


10 May 1978

Dear Karl, re: Passamaquoddy Tidal Project

I refer to your letter of December 13, 1977 inviting Canada to participate in or to observe the U.S. study on the Passamaquoddy Tidal Project. I have now been asked to inform you that Canada does not plan to participate in such a study but we would be interested in accepting your offer of naming an observer. Dr. R.C. Skinner, Environment Advisor, Science and Technology, Dept of Energy Mines and Resources will be the designated observer. His mailing address is 580 Booth Street, Ottawa K1A 0E4.

I would like to express to you and to the Corps of Engineers our appreciation for having extended this invitation to Canada.

Yours sincerely,


George Rejhan
Counsellor (Environment)

Mr. Karl Jonietz
Environmental Officer
Office of Canadian Affairs
Room 5227 Dept. of State
WASHINGTON, D.C. 20520



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDPL-H

5 April 1979

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

HQDA (DAEN-CWP-E)
WASH DC. 20314

1. References:

- a. NED letter dated 31 May 1977 subject as above and your 1st Indorsement dated 28 September 1977 concurring with our proceeding with a Plan of Study and investigation of "life-cycle" costing for subject project.
- b. NED letter dated 21 February 1978 which transmitted a Work Plan for the life-cycle cost analysis and your 1st Indorsement dated 8 May 1978 concurring with the plan presented for carrying out the costing study. At your suggestion to use a phrase other than "life-cycle", we are now referring to the economic study as "relative price shift analysis".
- c. Your letter dated 24 January 1979 subject: "Relative Price Shift Analysis" with comments on economic analysis for both the Dickey-Lincoln Lakes and Passamaquoddy Tidal Power Projects.

2. Forwarded herewith for your review and comment is draft report by this Division dated March 1979 and entitled, "Tidal Power Study in Cobscook Bay, Maine - Preliminary Report on the Economic Analysis of the Project". Reference 1a and 1b authorized this Division to proceed with evaluating the economics of the project on "life-cycle" or "relative price shift" analysis, as well as by the conventional Benefit-Cost Ratio method. It was agreed between your office and this Division that the project economics would be reanalyzed based on a "relative price shift" analysis, as the methodology utilized in the original "life-cycle" analysis was not in accordance with Water Resource Council regulations.

3. The results of this latest economic analysis indicate that the conventional Benefit-Cost Ratio for the better 5 (five) alternatives are evaluated including transmission, which range from .49 to 1.00. When these same 5 alternatives are evaluated utilizing relative price shift analysis and a fuel escalation rate of 5% for the years 1978-1994 and 1% for the years 1994-2023, the Benefit-Cost Ratio increases from .94 to 1.00.

5 April 1979

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

4. Although the project is presently not justified by the "net benefit rule" under traditional analysis, it appears that the tidal power project may have merit and warrant further investigations in view of the following:

- a. The high dependency of the State of Maine and of New England on foreign oil, and its uncertain availability in the future.
- b. The current unstable energy situation, and the expectation that additional time may afford a better opportunity to assess the future projections with more certainty.
- c. The appeal of using the tide, which is a twice-daily renewable and highly predictable regional resource, resulting in unquestioned oil savings to the Nation.
- d. The uniqueness of the project - one-of-a-kind in the Continental United States. Also, that the future energy situation may change current economic evaluations where tidal project (and small hydropower) may not have to meet strictly a BCR equal to unity requirement.

5. Because of considerations described in paragraph 4 above, preliminary sensitivity analyses were undertaken to determine whether the project warrants further consideration using modified criteria. These analyses, based on modified criteria, are summarized below.

- a. Since the primary purpose of the Tidal Power Project is Power generation, the conventional BCR and relative price shift analysis shown in paragraph 3 above is based on Federal Energy Regulatory Commission (FERC) derived power values, (31 mils/kwh for energy and no capacity value). No ancilliary benefits were included. A study done in 1976 (reference 1 in the main report) indicated that it might be appropriate to consider redevelopment, mariculture, and recreation as ancilliary benefits. Preliminary indications are that for the size of projects under consideration, these ancilliary benefits would be in the order of \$7,000,000 per year. This benefit has been incorporated into the analysis described in paragraph 3 with the following results:

	Projects as in Para. 3	Same Projects w/ ancilliary benefits
Range of Conventional BCR	.46 - .49	.64 - .77
Range of Relative Price Shift BCR	.52 - .94	.71 - 1.22

NEDPL-H

5 April 1979

SUBJECT: Passamaquoddy Tidal Power Project (CWIS #14023)

- b. Single pool tidal power projects have no dependable capacity unless a thermal or pumped storage device is provided to firm up capacity. Since no such device is included in this study, the tidal power projects considered have no dependable capacity. Their capacity is, however, reliable and predictable due to the regularity of the tides. It seems reasonable to assume that since the Department of Energy (DOE) is trying to develop a capacity credit for other alternate sources of energy such as wind power, and whereas tidal power is clearly predictable, that a significant capacity credit could be associated with tidal power. Owing to the extensive study involved no attempt has been made to determine an actual capacity credit, but required amounts of capacity credit for the projects described in paragraph 3 to reach unity have been determined and range from \$13.00/kw to \$112.00/kw. If the tidal power plant was "dependable", a capacity value of \$195/kw would be allowed by FERC.

6. Your review of the economic report is requested so that representatives of this Division could meet in your office on 11 April 1979 to discuss the report and the future of the study. Advance copies have been furnished.

FOR THE DIVISION ENGINEER:

JOSEPH L. IGNAZIO
Chief, Planning Division

cc: Col. Chandler
Mr. Ignazio
Mr. Fryar
Mr. Avtges
Mr. Callahan/Mr. LeBlanc
Mr. Rubin/Mr. McMahon
Planning Div. Files
(all w/incl.)

24 April 1979

Mr. James D. Gibson
Regional Engineer
Federal Energy Regulatory Commission
26 Federal Plaza
New York, New York 10007

Dear Mr. Gibson:

Reference is made to a meeting held at your office on 23 March 1978 regarding the inclosed preliminary report on the economic analysis of the Cobscook Bay Tidal Power Project. At that meeting several issues were discussed including the fact that power values furnished in your letter of 8 December 1978 have been used in the calculation of benefits for several tidal power alternatives which were not considered in the development of those initial power values.

It is, therefore, requested that you furnish at market and at site energy and capacity values for the following representative tidal power projects based on both privately and Federally financed alternatives:

Cobscook Bay Tidal Power Study

<u>Single Pool</u>	<u>Dependable Capacity (MW)</u>	<u>Installed Capacity (MW)</u>	<u>Annual Energy (GWh)</u>
Cooper	0	112	443
Cooper	0	140	490
Cooper	0	410	700
Birch	0	35	350
Birch	0	110	380
Sazer	0	20	92
Half Moon	0	5	10
<u>Two Pool</u>	25	26	400
<u>Linked Pool</u>	7	22	91

LeBlanc/510/wpc & cer

NEDPL-11

Mr. James D. Hebson

24 April 1979

Further, it would be appreciated if you would furnish a discussion on any concepts you or your staff may have regarding a "capacity credit" for the single pool projects which have predictable, reliable, non-dependable capacity.

Sincerely yours,

Incl
As stated

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

cf:
Mr. Guptill
✓ Mr. LeBlanc
Mr. Ignazio
Mr. Parker, Eng. Div.
Mr. Rubin
Plan Div. Files

DAEN-CWP-E (20 Apr 79) 1st Ind

SUBJECT: Checkpoint Meeting Held in OCE on 11 April 1979 on Cobscook
Bay Tidal Power - Economic Analysis

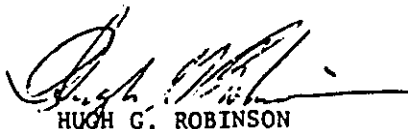
DA, Office of the Chief of Engineers, Washington, D.C. 20314 14 JUN 1979

TO: Division Engineer, New England

1. After review of the subject MFR, we have concluded that this study should proceed under Option 1.
2. Studies to date indicate that the project will not produce net benefits over costs for the life of the project, even using the relative price shift analysis. We cannot recommend projects for implementation where there are negative net benefits.
3. To date, approximately \$800,000 have been expended on this study; it would be difficult to justify expending another \$2,500,000 for further investigations for an uneconomic project.
4. We are concerned about the apparent lack of effort in identifying and assessing the environmental impacts of this project. This aspect has received very little attention, and we feel the potential for major adverse impacts is great.
5. More attention should be paid to integrating the power from Cobscook Bay into the power grid. Power can only be generated during relatively short periods of time, and even then the generating time will be out of phase with peak requirements most of the time. Consideration needs to be given to the use of off-peak power being generated from Cobscook Bay.
6. In view of the above, further work on the study is to be directed toward completing and submitting a negative Reconnaissance Report for transmittal to Congress in the shortest practicable time. Effort will concentrate on impact assessment and marketing of power. This effort will be of a reconnaissance level scope of detail.
7. As the FY 1980 appropriations process is still underway, you should determine your anticipated needs for this Fiscal Year and next. In line with this, we are requesting that you submit a schedule for completing the study and a breakdown of funding requirements for the remainder of the work.

FOR THE CHIEF OF ENGINEERS:

wd all incl



HUGH G. ROBINSON
Brigadier General, USA
Deputy Director of Civil Works

13 AUG 1979

NEDPL-H

Mr. Everett I. Baxter
City Manager
Eastport, Maine 04631

SEE ATTACHED LIST FOR ADDITIONAL
ADDRESSEES

Dear Mr. Baxter:

As you know this office has been conducting a study of potential tidal power development in the Passamaquoddy-Cobscook Bay region. The authority for this feasibility study was derived from a Resolution adopted on 21 March 1975 by the Committee on Public Works, United States Senate. Shortly after the study was funded, the Canadian Government formally indicated that it did not desire, at this time, to participate in a joint study of Passamaquoddy Bay. Therefore, the feasibility investigation has been limited to the Cobscook Bay area located entirely within the United States.

As an early part of the study, we prepared a preliminary economic analysis for several tidal power alternatives. A copy of the report is inclosed. The projects considered ranged in size from 4 megawatts to 450 MW, including single pool, two pool and multi-pool tidal projects. A single pool project was found more efficient than multi-pool alternatives.

Sensitivity analysis of project economics relative to price shifts of fuel costs for a thermal power plant alternative, indicated that tidal power would not provide net benefits over the life of a project. The reasons for this include those which have always weighed against the tidal power concept in this area, high initial construction costs and lack of dependable capacity.

The inclosed economic feasibility report was submitted to the Office of the Chief of Engineers for review. OCE concluded that the feasibility study findings should be submitted to Congress as a negative reconnaissance report following further study to identify environmental impacts and marketing of power. The reconnaissance report would recommend that no further study be made in the interest of developing a tidal power project in Cobscook Bay at this time.

Attached is a copy of a news release on the subject report. The release will be issued on 15 August to the general public.

Sincerely yours,

Incl
as stated
Mr. Guptill ✓
Reading File
Plan Div. File

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Division Engineer

LIST FOR ADDITIONAL ADDRESSEES

Mr. Kenneth Hodgdon
Town Clerk
Dennysville, Maine 04628

Mr. Carlton R. Leighton, Chairman
Board of Selectmen
Town of Lubec
Lubec, MAINE 04652

Board of Selectmen
Town of Pembroke
Pembroke, Maine 04666

Board of Selectmen
Town of Perry
Perry, Maine 04667

Town of Trescott
R.F.D. 3
Lubec, Maine 04652

Board of Selectmen
Town of Whiting
Whiting, Maine 04691

NEWS RELEASE

13 AUGUST 1979/79-429

COBSCOOK TIDAL POWER PROPOSALS FAIL ECONOMIC TESTS

FOR RELEASE 15 AUGUST 1979

WALTHAM, MASSACHUSETTS -- VARIOUS PROPOSALS TO PRODUCE ELECTRICITY BY HARNESSING THE ATLANTIC OCEAN TIDES IN NORTHERN MAINE'S COBSCOOK BAY ARE NOT JUSTIFIED AT THIS TIME ACCORDING TO A PRELIMINARY ECONOMIC REPORT RELEASED TODAY (WEDNESDAY) BY THE U. S. ARMY CORPS OF ENGINEERS.

COLONEL MAX B. SCHEIDER, THE CORPS' DIVISION ENGINEER IN NEW ENGLAND, WHERE THE STUDIES WERE PERFORMED, SAID "IT IS UNLIKELY UNDER PRESENT ECONOMIC CONDITIONS, AN ENTERPRISE ENTIRELY WITHIN U. S. WATERS COULD PRODUCE ENOUGH REVENUE FROM THE SALE OF ENERGY TO OFFSET THE FEDERAL INVESTMENT REQUIRED TO CONSTRUCT TIDAL POWER FACILITIES AT THIS SITE."

"WE LOOKED AT 13 BASIC PROPOSALS FOR TIDAL POWER GENERATION AND GAVE SPECIAL WEIGHT IN OUR ANALYSIS TO THE RISING COST OF OIL," COLONEL SCHEIDER EXPLAINED. "NEVERTHELESS, WE COULD NOT OVERCOME THE MAJOR DISADVANTAGES INHERENT TO A TIDAL PROJECT; NAMELY, THE HIGH INITIAL COST AND THE INABILITY OF A TIDAL INSTALLATION TO PRODUCE 'DEPENDABLE' GENERATING CAPACITY BECAUSE THE LUNAR CYCLE MAY BE OUT OF PHASE WITH THE DEMAND FOR ELECTRICITY AT ANY GIVEN TIME."

M O R E

NEW ENGLAND DIVISION, PUBLIC AFFAIRS OFFICE
WALTHAM, MA 617-894-2400 EX. 237/238

IN THE 62-PAGE REPORT ON THE ECONOMIC ANALYSIS OF THE PROJECT, THE CORPS CONCLUDES THAT NONE OF THE PLANS STUDIED COULD MEET THE ECONOMIC GUIDELINES REQUIRED BEFORE A PROJECT CAN BE CONSIDERED FOR FEDERAL FINANCING. THE ALTERNATIVES STUDIED RANGED FROM FOUR TO 450 MEGAWATTS OF INSTALLED CAPACITY WITH CONSTRUCTION COSTS ESTIMATED FROM \$21.3 MILLION TO OVER ONE BILLION DOLLARS AT 1979 PRICES.

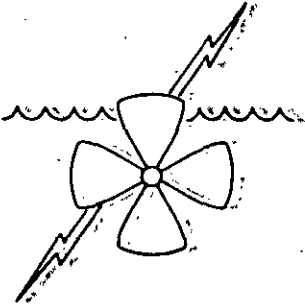
THE CORPS WILL UNDERTAKE LIMITED ENVIRONMENTAL AND ENGINEERING STUDIES NECESSARY TO COMPLETE ITS RECONNAISSANCE REPORT FOR SUBMISSION TO CONGRESS NEXT YEAR AND THAT MATERIAL, TOGETHER WITH THE TRANSCRIPT OF THE PUBLIC MEETINGS AND OTHER RECORDS, WILL BE AVAILABLE FOR FUTURE REFERENCE BY FEDERAL, STATE AND PRIVATE INTERESTS SHOULD CHANGING CIRCUMSTANCES RENEW INTEREST IN EXPLORING THE NEW ENGLAND TIDES AS A SOURCE OF ELECTRICAL POWER.

COPIES OF THE ECONOMIC STUDY REPORT MAY BE OBTAINED BY CONTACTING THE DIVISION ENGINEER, U. S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION, 424 TRAPELO ROAD, WALTHAM, MA 02154.

HALF-MOON COVE TIDAL POWER PROJECT

Passamaquoddy Tribe
Pleasant Point Reservation

Correspondence
P.O. Box 203
Eastport, Maine 04631
(207) 853-2790



TIDAL POWER COMMENTS

August 23, 1979

I have prepared a response to the most recent report released by the U.S. Army Corps of Engineers on the Cobscook Bay tidal power project. A copy of this position paper is enclosed for your information and reference.

Since the prospects of the Half Moon Cove are affected, in part, by any assessment of tidal power, I felt it was important to correct the inaccuracies contained in the Corps report and to present an alternative evaluation of a tidal project's long-term economic potential.

A great deal of effort has gone into the planning and development of this project. An in-depth feasibility study of the project will be completed by June of next year. This report will determine the project's future and outline the requirements for its construction. However, earlier studies performed by this office have indicated that the economics for the Half Moon Cove project are indeed favorable and that the construction of a demonstration project is the most logical approach for the actual development of tidal power.

Sincerely,

Normand Laberge

ENCLOSURE:

NL:bap

REPLY TO: TIDAL POWER STUDY
COBSCOOK BAY, MAINE

PRELIMINARY REPORT ON THE ECONOMIC
ANALYSIS OF THE PROJECT
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DIVISION

PREPARED BY: DR. NORMAND LABERGE
DIRECTOR, HALF-MOON COVE TIDAL
POWER PROJECT
PLEASANT POINT RESERVATION
PERRY, MAINE

DATE: 21. AUGUST 1979

The U.S. Army Corps of Engineers, New England Division, recently released a report which stated that, "Although tidal power appears to be attractive to many, it is still not justified in accordance with the Water Resource Council's guidelines". The report on the Obscook Bay Tidal Power Project titled, Preliminary Report on the Economic Analysis of the Project, was expected to serve as a prelude to an extensive three to four year investigation of the proposed Al-American tidal project. The conclusions reached by the Corps of Engineers might affect the prospects for the construction of a large tidal power project in Obscook Bay.

The Corps of Engineers report contains some favorable comments that could lead to a different interpretation if the results are reconsidered in terms of the project's long-term benefits. Specifically, these points are listed below;

- if the Obscook Bay Tidal Power Project had been built in 1936, the cost of energy would have been 0.78 ¢/kwh which is quite low when compared to today's production costs.
- relative price shift analysis which takes into account the net fuel escalation rate referenced to the rate of inflation indicates that various projects could achieve benefit-to-cost ratios approaching unity for their respective first years of operation.
- the fuel cost for the alternative (combined-cycle plant) compared to the proposed tidal project will probably continue to rise more rapidly than the rate of general inflation.

The prediction of future economic trends and the availability of future energy supplies encompasses drastic assumption which adds uncertainty to any form of economics based on life cycle cost analysis or relative price shift analysis. However, historical evidence and the desired transition to a less oil dependent economy will most likely constitute the necessary momentum to uphold the pertinent assumptions into the near-term future (1990-1995).

The Corps of Engineers in their report analyzed several small tidal projects. The information listed for the proposed Half-Moon Cove project was inaccurately presented and analyzed. The major areas of contention are discussed below;

- the assumption of a four megawatt (mw) plant capacity is less than the 10 mw optimum plant size determined from detailed computer calculations.
- the selection of FERC criteria for the value of tidal power (3.1 ¢/kwh for a capacity factor less than 40 % and 0.7 ¢/kwh otherwise) does not properly consider the fuel replacement value under optimal operating conditions and also omitted the statistical dependable capacity (10 % of 195 ¢/kw) attributable to predictable tidal power production.
- the Corps of Engineers estimates for small tidal projects included several cost components (i.e., relocation, fishways, real estate) that were much greater than expected from our calculations.

Project economics for Half-Moon Cove were recalculated under the Corps assumptions for high and low estimates. The 'low' case which reflects a realistic evaluation of the project cost estimates agrees remarkably well with our analysis. Using an energy value of 3.1 ¢/kwh and a 10 % capacity credit, the Half-Moon Cove project has a 0.77 benefit-cost ratio based on the low Corps estimates and without any fuel cost escalation rates.

Relative price shift analysis was performed for the various plant configurations. The results indicated that the economics for tidal power projects progressively improved with time due mainly to the renewable nature of tidal power produc-

tion; i.e., no fuel cost. However, the analysis improperly evaluated the power benefits for the first year of operation by using a smaller escalation period - 13 years versus 16 years. Another factor leading to a lower economic evaluation of the tidal project was the determination of the 'break-even' year which was presumably miscalculated. The Corps estimate of an eighteen year period after construction for the break-even year for the Cooper project was estimated to be only four to six years according to our analysis.

The latest Corps of Engineers report contradicts an earlier study prepared by the Stone & Webster Engineering Corporation for the U.S. Energy Research and Development Administration (ERDA, March 1977). The ERDA report using life cycle cost analysis estimated a 15 year break-even period for a 180 mw power plant at Cooper Island for a 7% inflation rate. The inflation rate was assessed uniformly for all cost components and did not include a fuel escalation rate above inflation. Project economics in the Corps' report should have improved the earlier findings for the following reasons; (1) higher power benefits (3.1¢/kwh versus 2.12¢/kwh), (2) longer project life (100 years versus 50 years), (3) reduced project cost for turbines and dams, and (4) the use of escalated fuel cost rates. The Stone and Webster report stated in 1977 that, "In comparing the various electric power generation options available in New England at this time, it is concluded that a tidal power plant in the Quoddy area would be a valuable asset".

The Half-Moon Cove project has received federal and State of Maine assistance to conduct an in-depth feasibility study which seems to make it the most likely project capable of being constructed in the near future. Besides providing regional power production, the project is also expected to serve demonstration purposes by enhancing the technical and economic potential of tidal power. The Corps of Engineers in their report have not described the total number of benefits associated with the Half-Moon Cove project and have also grossly underestimated the power benefits of this project. The concept of an integrated power network connected with a linked basin mode of development has been misrepresented by the Corps' improper analysis. The Half-Moon project in addition to the aforementioned benefits will provide employment opportunities, increase the economic potential for aquaculture development, research and develop tidal power, estimate possible environmental consequences, and serve as a potential catalyst for other tidal projects in the area.

The Corps of Engineers from their Waltham, Massachusetts office have decided to release the preliminary economic analysis which concludes that tidal power cannot be justified within very narrow guidelines. The timing and material content of this report are indeed very unfortunate since it does not reflect the importance of developing renewable resources with long-term returns as an answer to our present and future energy problems. The report itself has been challenged in terms of its economic analysis and in terms of its insensitivity towards regional demands. As director for the Half-Moon Cove project, I feel that our project offers the only reliable method of ensuring tidal power development from a local initiative perspective.

Appendix I enclosed with this reply documents the economic shortfalls of the analysis performed by the U.S. Army Corps of Engineers. The Half-Moon Cove project has also been re-analyzed to reflect a different interpretation of the Corps estimates. Life cycle cost analysis was included as a different perspective to the relative price shift analysis used by the Corps of Engineers.

APPENDIX

ANALYSIS OF CORPS OF ENGINEERS REPORT ON THE COBSCOOK BAY
TIDAL POWER STUDY

PREPARED BY, DR. NORMAND LABERGE

DATE PREPARED: 23. AUGUST 1979

HALF-MOON COVE TIDAL PROJECT
PLEASANT POINT RESERVATION
PERRY, MAINE

LIST OF TABLES

1. COST ESTIMATES: CORPS OF ENGINEERS
2. ECONOMIC ANALYSIS: HALF-MOON COVE PROJECT
3. PROJECTED TIDAL POWER VALUES
4. BREAK-EVEN YEAR ANALYSIS
5. LIFE CYCLE COST ANALYSIS: HALF-MOON COVE PROJECT (CORPS ESTIMATES)
6. LIFE CYCLE COST ANALYSIS: HALF-MOON COVE PROJECT (LABERGE ESTIMATES)
7. BENEFIT-COST RATIO: HALF-MOON COVE PROJECT

TABLE 1: EXPLANATION

Corps of Engineers cost estimates for two projects are listed and analyzed in terms of the following economic parameters:

interest rate - 6.875%
project life - 100 years
power value - 3.1¢/kwh (Capacity factor 0.4)
 0.7¢/kwh (Capacity factor 0.4)

The large single pool project at Cable Island is expected to produce power for 5.17¢/kwh as compared to the 10.19¢/kwh price for a small project on the Pennamaquam River. The annual power benefits are based on a criteria established by the Federal Energy Regulatory Commission (FERC) which restricts the production to a capacity factor less than forty percent. It should be noted that the optimum operating mode for power production from a single pool project has a capacity factor of approximately forty-five percent.

TABLE <u>1</u>	OPTIMUM SMALL SINGLE POOL ALTERNATIVE (PENNAQUAN RIVER)	SINGLE POOL ALT. WITH HIGH CAP. FACTOR (CABLE)
PLANT CAPACITY (MW)	5	100
CAPACITY FACTOR	.4338	.4909
ANNUAL ENERGY (10 ⁶ KWH)	19.0	430.0
PROJECT LIFE (YRS.)	100	100
<u>COST ELEMENTS (\$)</u>		
1. DAMS	24,300,000 (\$6.00/CU. YD.)	3,900,000 (\$4.50/CU. YD.)
2. NAVIGATIONAL LOCKS	7,000,000	NONE
3. GATES	41,000,000 (20 @ \$2,050,000)	2,200,000 (2 @ \$1,100,000)
4. POWER HOUSE	133,700,000	8,200,000
5. SERVICE FACILITIES	750,000 (7.50 \$/KW)	37,500 (7.50 \$/KW)
6. RELOCATION	8,500,000	4,000,000
7. FISHWAYS	2,300,000	1,000,000
BASIC COST	<u>\$217,550,000</u>	<u>\$19,337,500</u>
WITH CONTINGENCY (15%)	250,182,500	22,238,125
WITH ENGR.; SUPERVISION & ADMINISTRATION (10%)	275,200,750	24,461,937
8. REAL ESTATE	1,300,000	1,000,000
9. SERVICE EQUIPMENT	600,000	200,000
INTEREST DURING CONSTRUCTION (5.875%)	28,576,015	1,764,258
PROJECT INVESTMENT	<u>277,100,750</u>	<u>25,661,937</u>
COST OF INVESTMENT	305,676,765	27,426,196
<u>ANNUAL COST (\$)</u>		
INVESTMENT		
- INTEREST	1,885,538	21,015,000
- AMORTIZATION	2,459	27,000
ANNUAL) & M	35,000 (7 \$/KW)	700,000 (7 \$/KW)
UNIT MAJOR REPL.	13,500 (2.70 \$/KW)	270,000 (2.70 \$/KW)
ANNUAL COST	<u>\$1,936,497</u>	<u>\$22,012,535</u>
<u>ANNUAL BENEFITS (\$)</u>		
ENERGY	589,000 (3.1¢/kwh)	3,010,001 (.7¢/kwh)
DEPENDABLE	NONE	NONE
<u>ENERGY COST (¢/KWH)</u>		
TRANSM. COEF. 0.991	10.19	5.17

TABLE 2: EXPLANATION

The cost for the Half-Moon Cove tidal project presented in terms of three estimates. The far right hand column depicts the cost estimates derived by the project developer in a report prepared for the Department of Energy (Northeast Region) titled, Public Utility Integration with Tidal Power Production. The cost analysis referred to as 'Corps Estimates' was calculated in accordance with the unit price figures listed in Table 1. The Half-Moon Cove project was assumed to have an optimum capacity of 10 mw based on calculations performed by this office.

The justification of the project cost analysis as described in this paragraph for the selection of the low 'Corps Estimates' refers to an evaluation of the original Corps data (see Table 1). The powerhouse assumed to have one turbine rated at 10 mw would have a unit price closer to the Cable project of \$1,337/kw. The cost of relocation was considered to be much too high for the Pennamaquam River project and eliminated for the Half-Moon Cove power plant. The fishway is another dubious expense for Half-Moon Cove which in this case was reduced by 50% and probably should have been eliminated from the cost estimates. Real Estate was similarly reduced in accordance with a consideration of site characteristics. The bottom-line figure; i.e., cost of investment, for the Low Corps estimates is nearly equal to the 'Laberge estimate'. The difference is due to the use of a different contingency rate (15% versus 10%), cost of engineering (10% versus 7.2%), and interest rate (6.875% versus 7.0%) for the two respective estimates (Low Corps and Laberge).

The annual cost for the project estimates was determined according to the two aforementioned methods. The Corps estimates for operation and maintenance were much lower (\$7/kw) than our estimates (\$31.4/kw). This difference is reflected in the production cost which falls within the range of 4.70-5.46¢/kwh for the Low Corps and Laberge estimates, respectively.

The determination of power benefits is another area of contention resulting from the use of the FERC criteria. The arbitrary cut-off value of 40% for the capacity factor dramatically affects the benefit-cost ratio as illustrated in Table 2. The Low Corps estimate used a 3.1¢/kwh value for energy and a 10% capacity credit which produced a 0.77 benefit-cost ratio. However, the use of FERC criteria (0.7¢/kwh) without any capacity credit results in a 0.15 benefit-cost ratio. The estimates derived by Laberge (benefit-cost ratio of 0.663) represent a realistic evaluation of the Half-Moon Cove on the immediate returns anticipated from the project.

TABLE 2

HALF-MOON COVE (10 MW)

	CORPS ESTIMATES ^a		LABERGE ^b ESTIMATE
	HIGH	LOW	
1. DAMS (\$4.50/CU. YD.)	\$1,425,150	\$1,425,150	\$1,215,000
2. LOCKS	-	-	-
3. GATES (\$1,100,000 ea.)	2,200,000	2,200,000	2,546,000
4. POWERHOUSE	16,400,000 (\$1,640/KW-PENN.)	13,370,000 (\$1,337/KW-CABLE)	14,972,000
5. SERVICE FACILITIES (\$7.50/KW)	75,000	75,000	-
6. RELOCATION	4,000,000	-	-
7. FISHWAYS	1,000,000	500,000	-
BASIC COST	\$25,100,150	\$17,570,150	\$18,733,000
W. CONTINGENCY (15%)	28,865,170	20,205,670	20,866,000 (10%)
W. ENGR., SURVR. & ADMIN. (10%)	31,375,185	21,962,685	22,065,000 (7.2%)
8. REAL ESTATE	1,000,000	500,000	-
9. SERVICE EQUIPMENT	200,000	200,000	-
INTEREST DURING CON- STRUCTION	2,239,545	1,558,060	1,395,000 (7%)
PROJECT COST	\$32,575,185	\$22,662,685	\$22,065,000
COST OF INVESTMENT	34,814,730	24,220,745	23,460,000
ANNUAL COST (\$)			
INVESTMENT			
- INTEREST	2,393,515	1,665,175	1,642,000
- AMORTZ.	3,105	2,160	58,000
OPER. & MAINT. (\$7/kw)	70,000	70,000	314,000
MAJOR REPL. (\$2.70/kw)	27,000	27,000	35,000
	\$2,493,620	\$1,764,335	\$2,049,000
PRODUCTION DATA			
CAPACITY (MW)	10	10	10
CAP. FACTOR	.433	.433	.433
ANN. ENERGY (10 ⁶ KWH)	37,894,000	37,894,000	37,894,000
PROJECT LIFE (YR.)	100	100	30
POWER BENEFITS ^c			
ENERGY @ 3.1¢/kwh	-	1,164,140	1,164,140
@ 0.7¢/kwh	265,260	-	-
DEPENDABLE (10% OF \$195/kw)	-	195,000	195,000
	\$265,260	\$1,359,140	\$1,359,140
BENEFIT-COST RATIO	.106	.770	.663
PRODUCTION COST (¢/KWH)	6.64	4.70	5.46

a. BASED ON ESTIMATES LISTED IN TABLE 1

b. FROM, PUBLIC UTILITY INTEGRATION WITH
TIDAL POWER PRODUCTION, N. LABERGE PREPARED
FOR DOE, APRIL 1979

c. ASSUMED TRANSMISSION CO-EFFICIENT OF 0.991

TABLE 3: EXPLANATION

The use of relative price shift analysis is based on an assumption of fuel cost escalation rates above the general inflation rate. Table 3 lists the figures presented by the Corps for the power values escalated according to three different rates. The projected values supposedly represent values anticipated in 1994, the first year of operation.

An attempt was made at duplicating the Corps calculation. Table 3 shows the result of our attempts. The case which most closely approximates the Corps results would have an initial power value of 30.64 mills/kwh and an escalation period of 13.5 years which corresponds to the year when construction would start. However, a more representative formulation would seem to be a 31 mill/kwh initial value and a 16 year escalation period (from 1978 to 1994). This method would result in higher benefit-cost ratio as listed in the lower diagram of Table 3.

The major assumption involved in the above calculations is the use of the 31 mill/kwh value for tidal power based on the fuel replacement at an alternative combined-cycle plant. The methodology of relative price shift analysis intrinsically involves assumptions of fuel cost escalation rates that have been observed historically to lead the general inflation rate.

TABLE 3 : POWER VALUE
LISTED IN TABLE 6 (PG. 55)

FUEL ESCALATION RATE (1978-1994)	CORPS FIGURES (MILLS/kwh)
1%	35.4
3%	45.7
5%	59.3

POSTULATED METHOD OF DERIVATION

$P (1+i)^x$			
i	p=31 x=16	p=31 x=13	p=30.64 x=13.5
1%	36.4	35.3	35.1
3%	49.7	45.5	45.7
5%	67.7	58.5	59.2

WHERE: x=16, CORRESPONDS TO TIME SPAN FROM 1978 to 1994
 x=13, CORRESPONDS TO THE PERIOD FROM 1978 TO 1991, YEAR
 CONSTRUCTION STARTS
 x=13.5, DEC. 1978 TO JUNE 1991
 p, REFERS TO POWER VALUE (FERC-3.1¢/kwh) AND COMPUTER
 CALCULATED NUMBER (3.064¢/KWH)

NOW:

ASSUME p=31 AND x=16 IS A MORE APPROPRIATE METHOD OF ANALYSIS,
 TABLE 7 (PG. 55) WOULD THEN HAVE THE FOLLOWING REVISION

PROJECT	REPRESENTATIVE BENEFIT-COST RATIO		
	FUEL ESCALATION RATE		
COOPER	1%	3%	5%
p=31, x=13	.56	.73	.94
p=31, x=16*	.58	.80	1.09

* BASED ON FUEL REPLACEMENT VALUE OF TIDAL POWER

TABLE 4: EXPLANATION

The term break-even year refers to the year when the annual cost of a tidal power project would equal the annual power benefits. The Corps of Engineers in their report employed a method to calculate the break-even year which produced results that were intuitively too high. For example, the Cooper Island project with a benefit-cost ratio of 0.94 for a net fuel escalation rate of 5% was expected to take 18 years after operation to attain break-even status, i.e., 1.0 benefit-cost ratio. A desire to arrive at a more realistic evaluation provided the motivation for the analysis appearing in Table 4.

The project cost estimate for the Cooper project was broken down into the individual annual cost components. The calculation of annual cost under an assumed 4% inflation rate and for the three fuel escalation rate was performed in accordance with the equation referenced in Table 3. The results indicate that the project for a 5% fuel escalation rate would be cost-effective by the year 2000. The 1% and 3% fuel escalation rates would similarly provide cost-effective operation by the year 2010. These results differ quite emphatically from the figures presented on pg. 55 of the Corps report.

Table 4 also attempted to duplicate the Corps calculations with only limited success. This analysis is not designed to criticize the Corps of Engineers, but to point a different method of analysis which is more appropriate to the understanding of the long-term benefits of tidal power.

TABLE 4 : NUMBER OF YEARS
TO BREAK-EVEN POINT (TABLE 8, PG. 55)

1. FROM PAGE ii - COOPER PROJECT

	ANNUAL COST TIDAL POWER PROJECT	ANNUAL COST TRANSMISSION
FIXED CHARGES	26,527,688	2,445,800
MAJOR REPLC.	378,000	319,200
OPER. & MAINT.	980,000	
	<u>\$27,889,000</u>	<u>\$2,765,000</u>

2. THEN, ASSUMED 4% PER YEAR INFLATION (R)

YEAR	COMPLETE TIDAL AN. COST (\$)			POWER BENEFITS (\$)		
	FIXED	OTHER	TOTAL	1%	3%	5%
1994	28,973,488	1,677,200	30,650,688	83.54¢/kwh 17,190,000	84.57 22,191,000	85.93 28,795,000
2000*	22,898,168	1,677,200	24,575,368	18,247,531	23,556,194	30,566,472
2010	15,469,182	1,677,200	17,146,382	20,156,626		

$$* \frac{(\text{FIXED})}{(1+R)^x} + (\text{OTHER}) = (\text{POWER BENEFIT})(1+I)^x$$

where: R-INFLATION RATE (4%)

x-YEAR FROM 1994

I-FUEL ESCALATION RATE (1%/YR.)

3. POSTULATED CORPS METHOD, FOR COOPER PROJECT,

$$\text{AN. COST} = (\text{POWER BENEFIT})(1.01)^x$$

$$x = \frac{\text{LOG} [\text{CAN. COST} / (\text{POWER BENEFIT})]}{\text{LOG} (1.01)}$$

$$= \frac{\text{LOG} (30,654,000 / 28,795,000)}{\text{LOG} (1.01)}$$

$$x = 6.28 \text{ YR. (7 YR.)}$$

THEN, TOTAL NUMBER OF YEARS = 13+7 = 20
FROM 1978 TO 1998

NOTE: THIS DOES NOT AGREE WITH THE STATED DEFINITION (i.e.,
THE NUMBER OF YEARS AFTER PROJECT CONSTRUCTION)

FOR EXAMPLE, 3% RATE

$$30,540,588 = 22,191,000 (1+.01)^x$$

$$x = 32.46$$

WHICH IS BEYOND THE THIRTY YEAR PERIOD OF INTEREST

TABLE 5: EXPLANATION

The Corps of Engineers were constrained under regulations established by the Water Resource Council not to consider the effects of inflation on project economics. Relative price shift analysis was utilized as an estimate of the long-term benefits of renewable resources when compared to alternative power suppliers dependent on limited resources (e.g., combined cycle plant). However, assumptions regarding fuel escalation rates are probably just as accurate as inflationary trends. For this reason, a simplified form of life cycle cost analysis was performed for the Half Moon Cove project.

Table 5 presents the result of this analysis for the case of the Low Corps of Engineers estimate and for an assumed 4% rate of inflation. Three reference cases were selected for the power benefits of the project as described below:

TABLE 5-A -- 3.064¢/kwh, based on fuel replacement value determined by Laberge (Public Utility Integration with Tidal Power Production, DOE, April 1979) which agrees with the 3.1¢/kwh value used by the Corps and established by FERC.

TABLE 5-B -- 3.619¢/kwh, corresponds to the base case (3.1¢/kwh) plus a 10% dependable capacity credit (19.5¢/kw).

TABLE 5-C -- 5.029¢/kwh, refers to an estimate derived by Laberge which included: (1) the fuel replacement value, (2) charge for operation and maintenance of the tidal project, and (3) the adjusted capital cost charge attributed to the displacement value of constructing new conventional power plants.

the approximate number of years required to achieve break-even status are summarized below for the three reference cases:

POWER VALUE	FUEL ESCALATION RATE		
	1%	3%	5%
3.076¢/kwh	9	4	2
3.619¢/kwh	5	2	1
5.029¢/kwh	-	-	-

It should once again be noted that this analysis was performed for an assumed 4% inflation rate.

TABLE 5-A: HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	CORPS ESTIMATES ANNUAL COST (¢/kwh)				TIDAL POWER VALUE (¢/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.44	.19	.07	4.70	3.08	3.08	3.08
1985	5.84	.25	.09	6.18	4.33	4.94	5.62
1990	5.84	.30	.11	6.25	5.52	6.92	8.65
1995 ^e	5.84	.36	.13	6.33	7.05	9.72	13.31
2000	5.84	.43	.16	6.43	9.00	12.40	16.99
2005	5.84	.51	.19	6.54	11.48	15.83	21.68
2010	5.84	.62	.23	6.69	14.65	20.20	
2015	5.84	.74	.27	6.85	18.70		

a. PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD

b. OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION

c. COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION

d. BASED ON FUEL REPLACEMENT VALUE OF 3.076 ¢/KWH

e. FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 5-B : HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	CORPS ESTIMATES ANNUAL COST (¢/kwh)				TIDAL POWER VALUE (¢/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.44	.19	.07	4.70	3.62	3.62	3.62
1985	5.84	.25	.09	6.18	5.09	5.81	6.62
1990	5.84	.30	.11	6.25	6.50	8.15	10.18
1995 ^e	5.84	.36	.13	6.33	8.29	11.43	15.66
2000	5.84	.43	.16	6.43	10.59	14.59	19.99
2005	5.84	.51	.19	6.54	13.51	18.62	25.51
2010	5.84	.62	.23	6.69	17.24	23.76	
2015	5.84	.74	.27	6.85	22.01		

a. PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD

b. OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION

c. COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION

d. BASED ON FUEL REPLACEMENT VALUE OF 3.619 ¢/KWH

e. FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 5-C: HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	CORPS ESTIMATES ANNUAL COST (\$/kwh)				TIDAL POWER VALUE (\$/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.44	.19	.07	4.70	5.03	5.03	5.03
1985	5.84	.25	.09	6.18	7.08	8.08	9.19
1990	5.84	.30	.11	6.25	9.03	11.32	14.14
1995 ^e	5.84	.36	.13	6.33	11.53	15.88	21.76
2000	5.84	.43	.16	6.43	14.71	20.27	27.77
2005	5.84	.51	.19	6.54	18.78	25.88	
2010	5.84	.62	.23	6.69	23.96		
2015	5.84	.74	.27	6.85	30.58		

a. PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD

b. OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION

c. COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION

d. BASED ON FUEL REPLACEMENT VALUE OF 5.029 \$/KWH

e. FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 6: EXPLANATION

The same method employed in Table 5 was used for Table 6 except for the substitution of Corps estimates by Laberge estimates. The results for the projected number of years until break-even operation occurs are summarized below for the same three reference cases for power benefits:

POWER VALUE	FUEL ESCALATION RATE		
	1%	3%	5%
3.076¢/kwh	13	6	4
3.619¢/kwh	12	4	2
5.029¢/kwh	1	-	-

The same basic assumptions for these calculations were used in this analysis as indicated in the explanation for Table 5.

TABLE 6-*A* : HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	LABERGE ESTIMATES ANNUAL COST (¢/kwh)				TIDAL POWER VALUE (¢/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.53	.83	.09	5.45	3.08	3.08	3.08
1985	5.96	1.07	.12	7.15	4.33	4.94	5.62
1990	5.96	1.29	.14	7.39	5.52	6.92	8.65
1995 ^e	5.96	1.55	.17	7.68	7.05	9.72	13.31
2000	5.96	1.87	.20	8.03	9.00	12.40	16.99
2005	5.96	2.24	.24	8.44	11.48	15.83	21.68
2010	5.96	2.70	.29	8.95	14.65	20.20	
2015	5.96	3.24	.35	9.55	18.70		

- a. PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD
- b. OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION
- c. COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION
- d. BASED ON FUEL REPLACEMENT VALUE OF 3.076 ¢/KWH
- e. FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 6-B : HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	LABERGE ESTIMATES ANNUAL COST (¢/kwh)				TIDAL POWER VALUE (¢/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.53	.83	.09	5.45	3.62	3.62	3.62
1985	5.96	1.07	.12	7.15	5.09	5.81	6.62
1990	5.96	1.29	.14	7.39	6.50	8.15	10.18
1995 ^e	5.96	1.55	.17	7.68	8.29	11.43	15.66
2000	5.96	1.87	.20	8.03	10.59	14.59	19.99
2005	5.96	2.24	.24	8.44	13.51	18.62	25.51
2010	5.96	2.70	.29	8.95	17.24	23.76	
2015	5.96	3.24	.35	9.55	22.01		

a. PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD

b. OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION

c. COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION

d. BASED ON FUEL REPLACEMENT VALUE OF 3.619 ¢/KWH

e. FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 6-G HALF-MOON COVE

TIDAL POWER PROJECT

INFLATION RATE: 4%

YEAR	LABERGE ESTIMATES ANNUAL COST (¢/kwh)				TIDAL POWER VALUE (¢/kwh) ^d FOR FUEL ESCALATION RATE OF		
	FIXED ^a	O & M ^b	REPL. ^c	TOTAL	+1%	+3%	+5%
1978	4.53	.83	.09	5.45	5.03	5.03	5.03
1985	5.96	1.07	.12	7.15	7.08	8.08	9.19
1990	5.96	1.29	.14	7.39	9.03	11.32	14.14
1995 ^e	5.96	1.55	.17	7.68	11.53	15.80	21.76
2000	5.96	1.87	.20	8.03	14.71	20.27	27.77
2005	5.96	2.24	.24	8.44	18.78	25.88	
2010	5.96	2.70	.29	8.95	23.96		
2015	5.96	3.24	.35	9.55	30.58		

- 45
- PROJECT COST INCREASE AT (+) 0.67%/YR ABOVE INFLATION UNTIL THE YEAR 1984, WHICH CORRESPONDS TO THE MIDWAY POINT OF THE TWO YEAR CONSTRUCTION PERIOD
 - OPERATION AND MAINTENANCE COST INCREASE AT (-) 0.25%/YR WITH RESPECT TO INFLATION
 - COST OF ELECTRICAL MACHINERY AND EQUIPMENT (-) 0.25%/YR WITH RESPECT TO INFLATION
 - BASED ON FUEL REPLACEMENT VALUE OF 5.029 ¢/KWH
 - FUEL ESCALATION RATE OF 1%/YR AFTER 1994

TABLE 7: EXPLANATION

The benefit-cost ratio for the estimates listed in Tables 5 & 6 were calculated and presented on Table 7. The values referenced as Laberge estimates have less favorable values attributed to the Low Corps estimates. This behavior is due mainly to the higher rates for operation and maintenance assumed by Laberge.

TABLE 7 : HALF-MOON COVE
BENEFIT-TO-COST RATIO
(INFLATION RATE (4%))

VALUE (\$/kwh)	YEAR	FUEL COST ESCALATION RATE		
		1%	3%	5%
CORPS ESTIMATES				
3.076	1985	.70	.80	.91
	1995	1.11	1.54	2.10
3.619	1985	.82	.94	1.07
	1995	1.31	1.81	2.47
5.029	1985	1.14	1.31	1.49
	1995	1.82	2.51	3.44
LABERGE ESTIMATES				
3.076	1985	.62	.69	.79
	1995	.92	1.27	1.73
3.619	1985	.71	.81	.93
	1995	1.08	1.49	2.04
5.029	1985	.99	1.13	1.29
	1995	1.50	2.07	2.83



JOSEPH E. BRENNAN
GOVERNOR

STATE OF MAINE
OFFICE OF THE GOVERNOR
AUGUSTA, MAINE
04888

November 21, 1979

Col. Max B. Scheider
Division Engineer
Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Scheider:

The purpose of this letter is to comment upon the Army Corps' most recent analysis regarding the Cobscook Bay Tidal Project.

I have asked the Maine Office of Energy Resources and the Maine State Planning Office to review and analyze your "Preliminary Report on the Economic Analysis of the Project", along with previous studies of the Cobscook Bay Tidal project, the "Draft Plan of Study" of September 1978, and other aspects of proposed tidal power development in Passamaquoddy and Cobscook Bays in Maine. In addition, we have reviewed the independent analysis of the project report by Dr. Normand Leberge, Director of the Half-Moon Cove Tidal Power Project for the Pleasant Point Reservation of the Passamaquoddy Tribe. Based upon our analysis I would like to offer the following comments:

First, I believe that more value should be placed on an energy source that is not dependent on non-renewable fuels and that the relative "inflation proofing" that construction of a tidal project would provide should be stressed in any comparative economic analysis. While this "relative price shift" analysis is a step in the right direction and an improvement over conventional static economic analysis, I do not believe that the technique has been carried far enough.

Secondly, I am a little puzzled by the statement in your letter that further economic analysis in July, following the (then) most recent escalation in the cost of oil by OPEC nations, "did not increase the net benefits sufficiently for economic justification." Reference to page iii of the executive summary of the preliminary report indicates a substantial improvement in the benefit cost ratio to nearly 1 at the 3% differential fuel escalation rate, and to about 1.25 at the 5% differential fuel escalation rate for the five alternative proposals listed. It is my understanding that the Army Corps of Engineers has no authority under existing standards and guidelines to evaluate projects, or to recommend continued study, at these differential fuel escalation rates. In this regard, it is interesting to note that many responsible Federal officials, including the U.S. Department of Energy, are forecasting fuel costs to rise at 4-5% above the general rate of inflation through 1990.

Col. Max B. Scheider
November 21, 1979
Page 2

I am concerned that your preliminary economic analysis to date has, apparently, merely considered the energy benefits of the project without regard for socio-economic benefits, mariculture opportunities, technology demonstration benefits, and a host of other benefits that would be derived from this project. Such narrow consideration of project benefits seems to run counter to other projects that your division has studies, and to Federal guidelines in this area.

Finally, I am concerned that your analysis limited the "life-cycle" effects to relative price shifts of petroleum fuels, whereas true life-cycle costing would consider such other effects as the cost of replacement structures (35-40 year life for fossil plant equipment vs. 100+year life for tidal or hydro plants).

In summary, I find numerous areas in your analysis in which we are in disagreement, and I would appreciate an opportunity to pursue this further.

I have asked John Joseph of the Maine Office of Energy Resources (OER) to contact your agency to review these points in greater detail.

I understand the Army Corps is working with the OER and the Center for Balanced Growth to arrange a meeting to discuss a number of these concerns. I hope that meeting proves productive in terms of improving the long term energy planning process.

I look forward to working with you on this and various other matters of interest to the State of Maine.

Sincerely,


JOSEPH E. BRENNAN
Governor

JEB/sc

CC: Allen Pease, State Planning Office
John Joseph, Office of Energy Resources
Don Larrabee, Maine Office of the Governor - Washington, D.C.
Maine Congressional Delegation

NEDPL-H

4 December 1979

Mr. James D. Hebson
Regional Engineer
Federal Energy Regulatory Commission
26 Federal Plaza
New York, NY 10007

Dear Mr. Hebson:

We require updated power values for the Cobscook Bay Tidal Power Study.

It is requested that you furnish at-market energy and capacity values based on December 1979 fuel price levels for the following representative tidal power projects using both private and Federal financing (10-1/2 and 7-1/8, respectively):

<u>Project</u>	<u>Dependable Capacity (MW)</u>	<u>Installed Capacity (MW)</u>	<u>Annual Energy (GWH)</u>
Goose	0	100	430
Goose	0	200	750
Goose	0	400	1080
Goose	0	815	1430
Two-Pool	25	80	400
Linked Basin	7	22	91

In addition to the power values, we need updated combined cycle and combustion turbine input for the computer model which is described in Chapter 5 of the August 1979 Hydroelectric Power Evaluation manual. This information will be used by our office to update our relative price shift analysis.

If possible, please furnish your response by 7 January 1980.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

cc:
Mr. Ignazio
Mr. Guphill
Mr. Rubin
✓ Mr. LeBlanc
Plan. Div. Files
Reading Files

**FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007**

December 10, 1979

Colonel Max Scheider
Division Engineer
Department of the Army
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Scheider:

In accordance with Col. Chandler's letter of April 24, 1979, we calculated at-market and at-site power values for the Cobscook Bay project. The power values were calculated as of July 1979.

Oil-fired combined cycle generating stations were selected as the alternatives to six of the nine schemes for the project. Oil-fired combustion units were selected as the alternative to the 410 MW Cooper plan and a nuclear plant was the alternative to the 80 MW two-pool plan. The capacity costs used were \$197 per kW for the combustion turbine and \$365 for a combined cycle unit. For the nuclear plant, \$893 was used for private 10.50% financing and \$793 for the rate of Federal 7.13 percent. Our telephone survey of New England utilities showed delivered costs of number 2 fuel oil to average \$4.60 per million BTU for the beginning of August.

Nominal transmission of two 345 kV circuits, each 30 miles long, was assumed for the combined cycle alternatives while output from the combustion turbines was considered to be placed directly on the New England 115 kV network through step-up substations. The nuclear plant was assumed to be connected to the New England 345 kV grid by three circuits totaling 90 miles in length.

Estimated at-market and at-site power values for the Cobscook Bay project as of July 1979 are as follows:

COBSCOOK BAY POWER VALUES AS AT JULY 79

<u>Development</u>	<u>At-Market</u>			
	<u>Private, 10.50%</u>		<u>Federal, 7.13%</u>	
	<u>Capacity</u> <u>\$/KW</u>	<u>Energy</u> <u>mil/KWh</u>	<u>Capacity</u> <u>\$/kW</u>	<u>Energy</u> <u>Mil/KWh</u>
Cooper 110 MW	0	38	0	38
Cooper 140 MW	0	38	0	38
Cooper 410 MW	0	44	0	44
Birch 85 MW	0	38	0	38
Birch 110 MW	0	38	0	38
Razor 26 MW	0	38	0	38
half Moon 5 MW	0	38	0	38
Two-pool 80 MW	188	6	82	6
Linked-pool 22 MW	75	41	38	41

<u>Development</u>	<u>At-Site</u>			
	<u>Private, 10.50%</u>		<u>Federal, 7.13%</u>	
	<u>Capacity</u> <u>\$/KW</u>	<u>Energy</u> <u>Mil/KWh</u>	<u>Capacity</u> <u>\$/kW</u>	<u>Energy</u> <u>Mil/KWh</u>
Cooper 110 MW	0	38	0	38
Cooper 140 MW	0	38	0	38
Cooper 410 MW	0	44	0	44
Birch 85 MW	0	38	0	38
Birch 110 MW	0	38	0	38
Razor 26 MW	0	38	0	38
half Moon 5 MW	0	38	0	38
Two-pool 80 MW	170	6	73	6
Linked-pool 22 MW	56	40	28	40

Sincerely,

J. Craig Ziegman

James D. Hebson
Regional Engineer

22 January 1980

Mr. Kenelm Rucker
Chief, Division of Power Sales
Department of Energy
Southeastern Power Administration
Elberton, GA 30635

Dear Mr. Rucker:

As you know, this office is currently engaged in early planning efforts regarding the possibility of developing a tidal hydro-electric power facility in eastern Maine near Eastport at Cobscook Bay.

Approximately one year ago, a preliminary economic analysis was made and the inclosed report was prepared. The report concluded that "tidal power, though more competitive today, is still not justified...on the basis of economic analysis...". Upon review of the report, the Office of the Chief of Engineers instructed this office to prepare a more complete report which addressed the following specific areas: the environment and marketability of the power. In an effort to comply with their instructions, we are requesting that you initiate a marketing study.

Since our initial work for the economic study, we have refined our power and cost estimates. Our findings of last year indicated that the most economically attractive configurations for tidal power development at Cobscook Bay were relatively large single pool projects. Such projects produce power twice daily at times when pool elevation/ocean elevation relationships allow. Generation goes from zero to full output for a few hours, and then returns to zero. While these generation cycles are fully predictable, they are not controllable or retimable. The inclosed graphs and tables show output patterns for a typical month assuming a single pool tidal power project operating at a 40 percent capacity factor. The output shown on graphs and tables is expressed in terms of percent of installed capacity.

LeBlanc/cer/510

NEDPL-H

Mr. Kenelm Rucker

22 January 1980

As we have refined estimates and changed possible dam alignments, we have decided to settle on a typical alternative with the following characteristics for making analysis:

o Single Pool	
o Installed Capacity	+ 195 MW
o Dependable Capacity	0
o Annual Firm Energy	+ 660 GWH
o Capacity Factor	39
o First Cost of Plant and Transmission (July 1979)	\$608,000,000.00
o Total Investment (July 1979)	\$714,000,000.00

We are planning to release a report by midsummer 1980. To meet that schedule, we are attempting to compile all report input, including marketing analyses, by early June 1980. For further information and coordination regarding this request, please contact me, Mr. Harmon Guphill, Chief, Hydroelectric Energy Studies Branch, or Mr. Robert LeBlanc, Study Manager.

Sincerely,

2 Incls.
As stated

JOSEPH L. IGNAZIO
Chief, Planning Division

cc:
Mr. Ignazio
Mr. Guphill
Mr. LeBlanc
Plan. Div. Files

NEDPL-H

21 February 1980

Dr. Normand Laberge
P. O. Box 203
Eastport, Maine 04631

Dear Dr. Laberge:

I wish to take this opportunity to thank you for sending us copies of your previous reports. Primarily, however, I am writing to you about another matter which you have briefly discussed with my staff. According to your published reports, you are planning to locate a powerhouse at the site of the old Route 190 bridge at Bar Harbor on the southwestern side of Half Moon Cove. You plan to maintain Half Moon Cove as a high pool and generate into Cobscook Bay which you assume will continue to experience natural tide cycles.

You have, no doubt, observed in your review of our March 1979 economics report that four of the five projects highlighted in the executive summary of that report would preclude the implementation of your project as planned or that your project would preclude them.

All project sites for development of tidal power in Cobscook Bay which are located seaward of Half Moon Cove would require that Cobscook Bay be utilized as a high level pool. If the Half Moon Cove project is modified so that a dam instead of a powerhouse is built at the Route 190 bridge site and the proposed powerhouse be sited at either Carlow Island dam or Pleasant Point dam, power could be generated by discharging into Western Passage. Thus the project would be independent of Cobscook Bay and would not preclude development of the larger power potential in Cobscook Bay. Inclosed is a copy of a map of Cobscook Bay which may help to clarify our concern with your project proposal.

It is my hope that your future planning efforts will address these alternatives. We look forward to cooperating with you in our mutual efforts to fully realize the power potential of Cobscook Bay.

Sincerely,

Incl
As stated

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Division Engineer

cc: Maine State Energy Off.

4 March 80



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: EOFD

Mr. Robert LeBlanc, Study Manager
Cobscook Bay Tidal Power Study
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Bob:

In response to your request, attached is a table of investment and annual cost estimates for the transmission facilities needed to integrate 200 MW of tidal power generation from Cobscook Bay into the New England transmission grid. The interest rate used in developing the annual costs and IDC is 7-1/8%. O&M costs are based on actual O&M costs for similar facilities on the BPA system.

For a generating capacity of 200 MW, the integrating transmission will most likely be either 230-kV or 345-kV. The investment cost of a 345-kV system is comparable to that of a 230-kV system. The 230-kV alternative has lower line costs but greater substation costs. Since transmission losses will be lower for 345-kV, we have assumed a 345-kV system in developing the cost estimates. Peak losses are in the order of 1.5% for a 345-kV system and 4.0% for a 230-kV system.

A 345-kV system will also have the advantage of not introducing a new voltage level into the area (115-kV and 345-kV being the existing voltage levels). A sketch of the integrating transmission system is attached. The system includes a 69-kV line from the project to Calais.

We have not included any facilities for transformation at Epping because it is not certain that the cost of these facilities should be part of the project cost. Also the need for such facilities has not been thoroughly investigated. However, the addition of a 345/115-kV transformer bank at Epping will improve the reliability of service to that area.

We hope the information we are providing will satisfy your needs. Let us know if you have any questions concerning these cost estimates.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. B. Poon". The signature is fluid and cursive, with the first name "R." and last name "Poon" clearly distinguishable.

R. B. Poon
Electrical Engineer

Enclosure (2)

Cobscook Bay Tidal Power Project

Cost Estimates - Transmission Facilities
(7 1/8% Interest Rate)

	<u>Investment (\$000)</u>			<u>Annual Cost (\$000)</u>		
	<u>Construction</u>	<u>IDC</u>	<u>Total</u>	<u>I&A</u>	<u>O&M</u>	<u>Total</u>
<u>Lines</u>						
Quoddy-Orrington 345-kV WHF (111 miles)	20,000	3,340	23,340	1,790	200	1,990
Quoddy-Calais 69-kV WHF (30 miles)	4,000	670	4,670	360	40	400
Subtotal	24,000	4,010	28,010	2,150	240	2,390
<u>Substation Facilities</u>						
Quoddy -- 345/69-kV Transformer	3,100	520	3,620	300	40	340
2-345-kV PCB's	1,500	250	1,750	150	50	200
Calais -- 69-kV PCB	150	30	180	20	10	30
Orrington -- 2-345-kV PCB's	1,500	250	1,750	150	50	200
Subtotal	6,250	1,050	7,300	620	150	770
<u>Power System Control</u>	1,000	170	1,170	110	50	160
Total	31,250	5,230	36,480	2,880	440	3,320

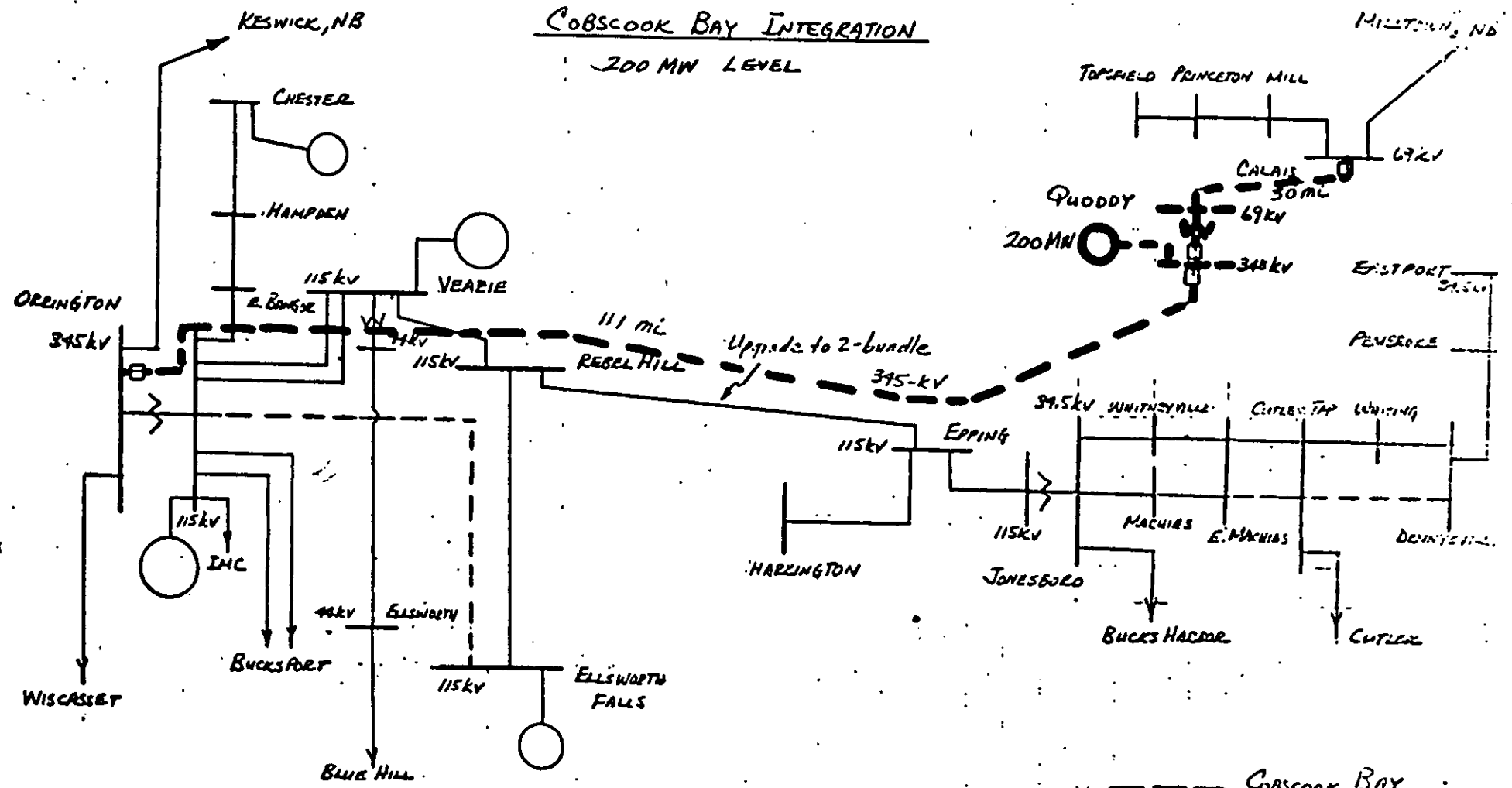
Note:

Service Life: Lines (WHF) 38 yrs
Substation 28 yrs
PSC 20 yrs

IDC @ 7 1/8% interest: 116.7% of construction cost

Bonneville Power Administration
Branch of System Engineering
March 4, 1980

COBSCOOK BAY INTEGRATION 200 MW LEVEL



----- COBSCOOK BAY INTEGRATION
 - - - - Additions By 1975

BANGOR HYDRO-ELECTRIC SYSTEM TO EASTPORT

59



STATE OF MAINE
OFFICE OF THE GOVERNOR
AUGUSTA, MAINE
04888

JOSEPH E. BRENNAN
GOVERNOR

March 5, 1980

Colonel Max B. Scheider
Division Engineer
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Col. Scheider:

I appreciated the briefing which you and your staff provided me on Monday, 21 January 1980, relating to energy projects for Maine which are currently under study by your Division.

I believe that Maine's future energy needs will be well served by continuation of St. John River Basin Study with emphasis on Masardis and Castle Hill hydro potential on the Aroostook River. In addition, I support a continuation of the tidal power study at Cobscook Bay. I believe that project economics of alternatives under consideration although marginal at this time, will in my view improve with the increasing costs of alternative fossil fuels. Further, the latest economic analysis as now permitted by recently issued Principles and Standards relating to "Relative Price Shifts" could well move the project into economic justification.

Regarding the important and significant Dickey-Lincoln project, I look with much interest upon the Corps completion of the mitigation planning which will finalize environmental evaluation and Environmental Impact Statement so that an objective decision can be made as to proceeding with construction of this important hydro project.

My thanks to you and your staff for your informative briefing, and be assured I will work with you to further these projects.

Sincerely,


JOSEPH E. BRENNAN
Governor

JEB/sc



Department of Energy
Southeastern Power Administration
Elberton, Georgia 30635

March 31, 1980

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division
Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

This responds to your letters of January 22, 1980, and February 8, 1980, File NEDPL-H, concerning the possibility of developing a tidal hydroelectric power facility in eastern Maine near Eastport at Cobscook Bay.


Utilizing the data furnished by these letters, the energy from the project would cost an average of approximately 94 mills per kwh excluding any marketing costs. No capacity values can be found for this project.

This estimated cost of 94 mills is almost two and one-half times the FERC estimated energy value of 38 mills per kwh based on August 1979 price levels and is approximately twice the anticipated energy value estimate of 49 mills per kwh based on December 1979 oil price levels.

In light of the above comparisons, it is evident that the project is not financially feasible under existing criteria and the preparation of operating and marketing studies would not be warranted.

If the price of alternative energy continues to increase or evaluation criteria is changed, we will be happy to cooperate with you in future studies.

Sincerely,

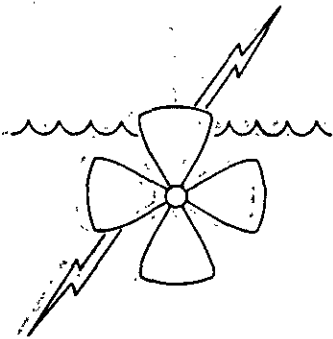

Harry F. Wright
Administrator

cc:
Emerson Harper

HALF-MOON COVE TIDAL POWER PROJECT

Passamaquoddy Tribe
Pleasant Point Reservation

Correspondence
P.O. Box 203
Eastport, Maine 04631
(207) 853-2790



April 19, 1980

Colonel Max. B. Scheider
Division Engineer
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Scheider:

Reference is made to your letter wherein it was suggested that consideration be given to a relocation of the historic siting of the Half Moon Cove Tidal Power Plant to an area at Carlow Island or in the proximity of Pleasant Point. Further reference is made to the meeting in your office on April 1, 1980, at which time this subject was discussed with you and your staff.

The suggested relocation has been considered, and it is found that it would have drastic impact, especially in increased construction costs, markedly decreasing the project's economic feasibility which at its best is marginal.

Technically, the militating factors would be:

1. Considerable ledge rock excavation to develop an adequate tail-water section.
2. Extensive removal of overburden on the pool side where water depths are shallow at both sites.
3. Temporary relocation of existing roadway and railroad line during construction and reconstruction after construction of the powerhouse.
4. Possibility of environmental obstacles from removal of dredged material and disposal of same.

These factors merit weighing in comparison with the originally proposed site: a relatively deep and natural channel; depth to rock of approximately 40 feet; minimal dredging; access to site; proximity to transmission lines; and a lesser environmental concern.

Awareness of the several Corps Cobscook Bay Plans is acknowledged, but it is strongly felt that the Half Moon Cove Project and the selected Corps Plan can, with proper planning and coordination, be compatible especially with reversible turbines at Half Moon Cove. This provision would enable Half Moon Cove to operate as a "low pool" whenever the larger pool is placed in operation. This can be accomplished at a later date by installing filling and emptying gates into Passamaquoddy Bay. This could be affected at a much lower cost than powerhouse construction as the gates would only need to extend to the lowest low tide level. The flexibility of the reversible turbines would generate more electricity, even though increasing construction cost, with the basin-to-sea and sea-to-basin operation.

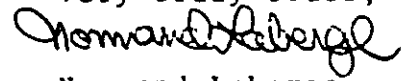
Another factor of consideration is that although the Half Moon Cove Project is in the feasibility state if it merits design and construction, it is likely that it could be in operation for 6 to 10 years earlier than the Corps candidate. Thus as a pilot plant, it could furnish considerable research possibilities enhancing the state-of-the-art in tidal power generation while meeting generation needs for the period.

As you are aware, the Passamaquoddy Tribal Council have negotiated a contract with the firm of Chas. T. Main, Inc., to prepare a feasibility report under a DOE grant. A change at this time would result in a serious impediment to the process. Therefore, it would be beneficial to our interests if we could proceed with the original Half Moon Cove powerhouse siting.

In summary, the additional costs of the powerhouse would severely damage the Half Moon Cove economic feasibility; it is felt that the project and a Cobscook Bay Plan candidate are compatible, especially with relatively minor modifications to the Half Moon Cove Project, if necessary, as cited.

Your favorable consideration is requested.

Very Truly Yours,


Normand Laberge

NEDPL-H

6 May 1980

Dr. Normand Laberge
P.O. Box 203
Eastport, Maine 04631

Dear Dr. Laberge:

I am writing in response to your letter of 19 April 1980 in which you outline several technical reasons why you believe the relocation of your power plant for Half Moon Cove Tidal Project would have significant impact and severely damage the project's economic feasibility.

Your letter acknowledges that if the Half Moon Cove Project were built and a Corps tidal project were to be implemented seaward of the proposed Half Moon Cove powerhouse, the two could be made compatible through installation of filling and emptying gates leading to the Western Passage in Passamaquoddy Bay. The Half Moon Cove powerhouse could then be operated by installation of reversible turbines.

As was discussed in our meeting with you on 1 April 1980, the future of the Corps study and subsequent implementation of a project is unknown at this time. Certain project layouts have been found economically feasible utilizing "relative price shift" analysis which is now permitted by the Water Resource Council.

I believe a favored course of action at this time for both studies would be to proceed as we are, maintaining close coordination, recognizing that there are engineering measures that could be taken at some future date to accommodate both projects in Cobscook Bay.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

cc:
Mr. Ignazio
Mr. Guptill
Mr. LeBlanc ✓
Plan. Div. Files
Reading Files

NEDPL-II

13 May 1980

Mr. James R. Smith, Director
New England Power Planning
174 Brush Hill Avenue
W. Springfield, MA 01118

Dear Mr. Smith:

This office is currently conducting a preliminary feasibility study for the development of a Tidal Power Project at Cobscook Bay near Eastport, Maine.

Currently, we are concentrating on large, single pool, ebb tide generation projects. We are concerned about whether the New England System could absorb the energy from such projects. The envisioned projects produce energy intermittently; i.e., they generate for about 6 hours and then stop for about 6 hours, following the tides. The tides recur every 12 hours and 25 minutes, and therefore, appear to advance with respect to our 24 hour solar day. In other words, the generation occurs at a different time every day and occurs as frequently at 3 AM as it does at 6 AM. To further complicate the pattern of available energy, available head varies as a function of tide range which fluctuates on a monthly basis from about 13 feet at neaps to about 26 feet at springs. During the 6 hours of generation, the energy produced varies as the head varies with the tailwater elevation (the falling ocean). In spite of all these variables, it is possible to accurately predict tidal power project output using tide tables. Unfortunately, it is not possible to retime the output from a single pool project and, of course, the capacity is not dependable.

We have found that projects ranging between 150 and 250 megawatts (560 and 750 gigawatt hours annually) appear to be able to produce energy at the lowest cost. We would appreciate it if you could inform us as to whether the energy from such a tidal project could be integrated and utilized by NEPOOL from an electrical and tidal operational viewpoint.

We are also concerned about what types of units would be displaced by such a project. If possible, please furnish us with typical

LeBlanc/cer/510

NEDPL-H

13 May 1980

Mr. James R. Smith, Director

daily load/generation mix curves depicting winter and summer peaks,
as well as average days for calendar years 1979 and 1995, respec-
tively.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

cc:
Mr. Zingman, FERC, NY
cc:
Mr. LeBlanc ✓
Mr. Guptill
Reading Files
Plan. Div. Files

NEPLAN

New England Power Planning

174 BRUSH HILL AVENUE
WEST SPRINGFIELD, MASSACHUSETTS 01089
TELEPHONE (413) 785-5871

July 3, 1980

Max B. Scheider
Colonel, Corps of Engineers
Division Engineer
NED, Corp of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Scheider:

As requested in your letter of May 13, 1980 and in accordance with previous discussions held with Messrs. Guptill and LeBlanc of your office we are enclosing the following data for use in evaluating your tidal hydro project at Cobscook Bay.

- Exhibit 1. Hourly loads and actual non oil-fired dispatch of pool generation for the winter peak load day of Dec. 19, 1979.
- Exhibit 2. Hourly loads and actual non oil-fired dispatch of pool generation for the summer peak load day of Aug. 2, 1979.
- Exhibit 3. Hourly loads and actual non oil-fired dispatch of pool generation for typical Spring and Fall days of 1979, viz, April 18th & Oct. 10th.
- Exhibit 4. Generation plant data showing unit type, dispatch priority, average full load cost in \$/MWH (parameters are: fuel cost, unit heat rate, and transmission penalty factors to the New England Center).
- Exhibit 5. Forecasted 1995 hourly loads for the winter, summer, spring, and fall for the peak day and for a typical weekday.
- Exhibit 6. Anticipated 1995 winter thermal priority list of Nuclear & Coal fired generation.

With respect to additions to the generating system through January 1996, we suggest you refer to the "New England Load and

Capacity Report, 1980-1995." copies of which were furnished to your personnel at our office recently. Please use only the authorized units as noted on page 55, Appendix B. Exhibit #6 indicates the addition of the 4-1150 nuclear units and the Sears Island coal unit.

With respect to the fuel costs, those shown on the enclosed exhibits are current 1980 costs. Forecasting of costs to 1995 is left to your own methods and trending procedures.

In regards to scheduled maintenance for your 1995 energy replacement study, we suggest you assume the average availability rates indicated on Exhibits 4 & 6 for determining the amount of thermal capacity required to meet the load for all periods of the year. We anticipate, with adequate funding and favorable EPA decisions, that several more existing units will be burning coal by 1995. These units are shown on Exhibit 6 with the appropriate availability rates. Those units still burning oil in 1995 should follow the coal units in the thermal priority list maintaining the same relative priority ranking they have to each other on Exhibit 4.

With respect to the output from the proposed tidal project, we concur that the capacity could not be considered dependable because of the inability to time the output with the daily load demands.

We anticipate no problems in integrating the energy from the proposed tidal project into the total New England load. However, studies would have to be made with respect to details of the specific electrical intertie and the operational impact on the local utility's system.

As discussed with Mrs. LeBlanc, by Mr. Ferreira on July 2, our office will be available for clarification and response to questions on the enclosed data and for further detail with respect to your study.

Sincerely,

Art Barstow

Arthur W. Barstow
Manager, Generation Planning

AF/AWB/jel
enc.

c.c. NEPOOL Planning Committee (letters only)
A. Ferreira

FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

August 29, 1980

Colonel Max B. Scheider
Division Engineer
Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Coloner Scheider:

In accordance with your letter of December 4, 1979 and your subsequent submittal of May 8, 1980, we have calculated at-market power values for the Cobscook Bay Tidal Power Project. The power values are calculated for the 38.7 percent capacity factor Birch configuration only. The same power values apply to the 38.6 percent capacity factor Goose configuration. This is in accordance with a May 1, 1980 telephone conversation between Mr. F. Craig Zingman of this office and Mr. Robert Le Blanc of your office.

The Cobscook Bay Project has been analyzed on a life cycle cost basis for the one hundred year period beginning with the expected project on line date of 1995. We note that the electrical output of the two single pool projects is controlled by the tide and electrical power is available at approximately 13-hour intervals, for relatively short periods, and at varying peak outputs. The availability of power from the project would concur with periods of peak utility demand only once every several days. For this reason, the capacity value (dollars per kilowatt-year) has been taken to be zero. The energy value represents the total value of Cobscook Bay and reflects the displacement value of energy from oil-fired generating units from 1995 through 2095.

The cost of the oil fuel displaced by the Cobscook Bay Project was escalated in accordance with the Department of Energy-Office of Conservation and Solar Energy tables which were published in the Federal Register on January 23, 1980. This DOE table is based upon constant dollars and the oil prices shown are escalated from 1980 through 2010 at a rate above the general rate of inflation. Ater that, fuel prices were assumed to increase along with the general rate of inflation, i.e., no increase using the

constant dollar method (see the attached Figure 1). All displaced energy costs were discounted to the year 1995, using the federal interest rate of 7-1/8 percent and the private interest rate of 11.5 percent. These discounted costs were summed and then multiplied by the one hundred year capital recovery factor appropriate to each interest rate. The power values are shown below:

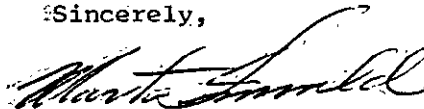
Cobscook Bay Power Values

	<u>Capacity Value</u> (\$/kW-Yr)	<u>Energy Value</u> (Mills/kW-hr.)
Federal Cost of Money 7-1/8%	0	108
Private Cost of Money 11-1/2%	0	104

It should be noted that, since these power values were calculated on the constant dollar basis, they are comparable to project construction cost estimates calculated on the same basis for the 1980 through 1995 period.

Should you have any questions concerning these power values or our method of calculations, please call Mr. F. Craig Zingman on FTS - 264-1163.

Sincerely,

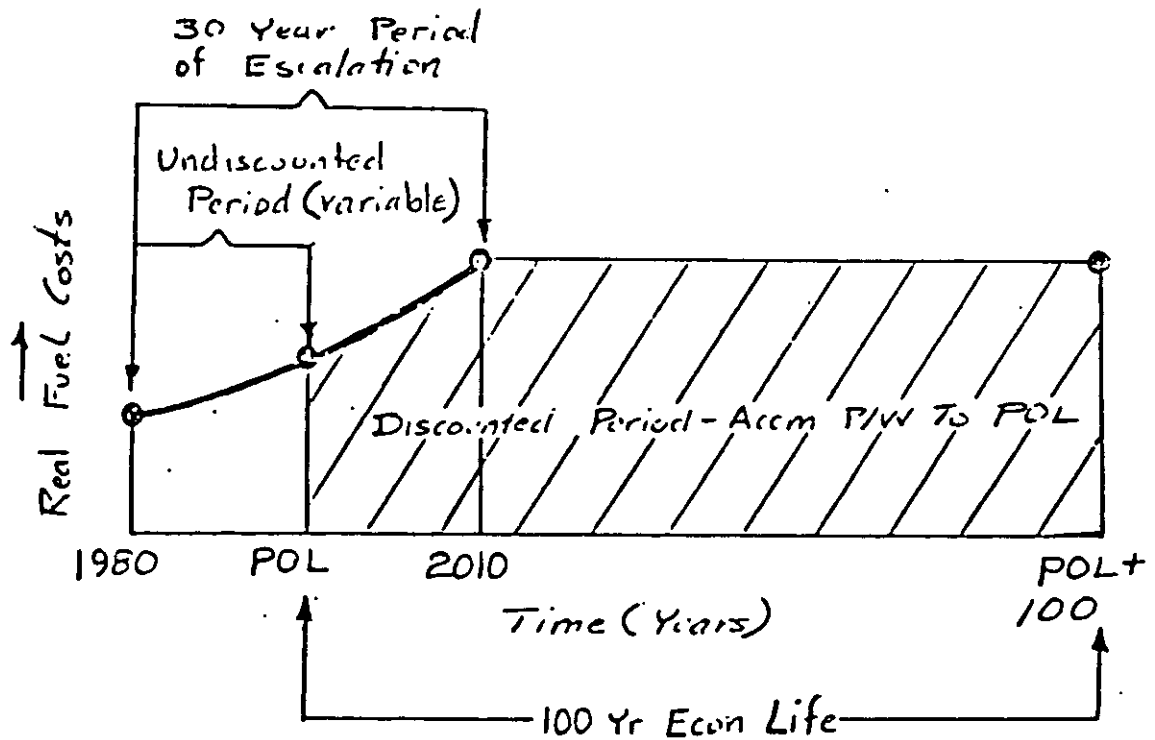


Martin Inwald
Acting Regional Engineer

Enclosure
as stated

FIGURE 1

DISCOUNTING METHODOLOGY
REAL FUEL ESCALATION



WORKSHOP SUMMARIES

AND

NEWSCLIPPINGS

TIDAL POWER STUDY

Miscellaneous Document
Summary of Workshop Proceedings

This document is furnished for information purposes only. Its contents do not necessarily reflect official Corps of Engineers policies. Data are subject to adjustment as a result of technical review and should be verified prior to any republication by contacting the Tidal Study Manager, U. S. Army Corps of Engineers, 424 Trapelo Road, Waltham, Massachusetts 02154.

August 1978



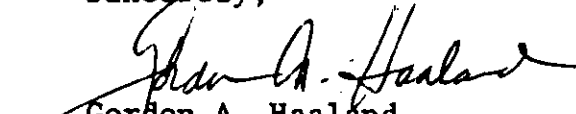
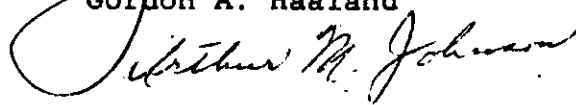
UNIVERSITY OF MAINE *at Orono*

Dear Workshop Participant:

Enclosed are the minutes of all of the workshops which were held by the University of Maine, Orono, for the Tidal Power Study and Cobscook Bay. Also included is a brief summary of the major results as interpreted by us. We are submitting copies of this to the Corps of Engineers but would welcome further comment by you. We will forward all correspondence.

Thanks for your participation. Your involvement has been crucial to the development of a good Plan of Study.

Sincerely,


Gordon A. Haaland

Arthur M. Johnson

THE WORKSHOPS

As part of their concern for informed public involvement, the U. S. Army Corps of Engineers contracted with the University of Maine, Orono, to organize a series of workshops on topics of major importance in developing a Plan of Study for a tidal power project in Cobscook Bay, Maine. The workshops were:

Eastport	May 31	The Tidal Power Concept, Local Concerns, and an Introduction to the Study
Orono	June 5	Natural Resources and Environmental Considerations
Augusta	June 7	Energy Alternatives
Portland	June 9	Social-Cultural Considerations
Boston	June 12	Economic Factors

The people invited to the workshops represented special expertise in one or more of the issues to be discussed by the workshop. The composition of the workshop group varied according to the topic but typically included local residents, scientists, professionals, State agency personnel, representatives from public and private utilities, Federal agencies, and other relevant groups.

The goals of the workshops were to familiarize the participants with the Plan of Study process and to provide an opportunity for the participants to help identify issues of concern and thereby to shape the studies and research necessary for a thorough Plan of Study.

The workshops were semi-structured discussions which revolved around a series of issues and questions relevant to the workshop topic. The participants refined the questions and issues and raised pertinent points for the consideration of the U. S. Army Corps of Engineers as it pursues the Plan of Study.

Major Results of Cobscook Bay Tidal Power Project Workshops

This section on major results of the workshops represents the distillation of workshop discussion by the workshop coordinators, Dr. Arthur Johnson and Dr. Gordon Haaland. These results do not represent conclusion of the U. S. Army Corps of Engineers. They represent the workshop coordinators' judgment of the primary issues raised in the several workshops.

1. Public Interest

There appeared to be a high level of public interest in the project. Attendance relative to invitations was substantial and many who did not attend sent regrets. Almost all of the people who attended the workshops appeared to believe that tidal power is an energy alternative well worth investigating. Comments and criticisms were offered in a friendly vein rather than as an effort to discredit the concept.

2. Economics

The economics of the project are very unclear. Much will depend on the future rate of inflation and technological developments. While considerable interest was expressed in the life cycle cost approach, it was pointed out that its validity depends on its assumptions. Skepticism was expressed about the accuracy of any long term fuel cost predictions. It was further noted that technological development may make fundamental changes in the economics of power generation. In addition, the life cycle approach raises many questions about appropriate comparisons between tidal power and other alternative energy sources.

It was suggested that any economic analysis, whether BCR or life cycle, should include a comparable economic analysis for the environment. This project might be used to establish appropriate guidelines for such an analysis.

3. Key Environmental Issue

The potential physical changes in Cobscook Bay and its waters is the key environmental issue. This issue came up in every workshop in one form or another. There were informed comments about the Bay possibly being a unique marine habitat and that changes in it would have far-reaching repercussions. It was also pointed out that much remains to be done to determine the population of birds and marine life now in the Bay.

4. Private Participation

In several workshops it was suggested that private, and possibly State, participation in the project would make it more interesting and probably more valuable for Maine. This was one approach to a frequently expressed interest in having at least some of the power generated available for industrial and other purposes in the State.

5. Community Considerations

It was generally agreed that the project would have

major short and long term effects on communities in the Cobscook Bay region. Particular concern was expressed about the type of housing that would be provided construction workers and its potential for local use after they are gone. While employment at good wage scales for local workers was regarded as a positive consideration, concern was expressed about these people's employment opportunities after construction is completed. The relatively small number of permanent operating personnel does not appear to offer a significant local labor demand. For this reason the possibilities of using some of the power generated to attract industry to the area seemed to be favorably regarded.

6. Pittston and Half Moon Cove Projects

It is clearly important at each stage of this project to consider its relationship to the proposed Pittston refinery and to the pilot tidal project at Half Moon Cove. Concern about these matters was expressed at all workshops and each of these projects has important local constituents. No federal tidal power plan would be acceptable locally if it did take these projects into account.

7. Canadian Tidal Power

The idea of an all-U.S. tidal power project has widespread appeal. However, the need for appraising its effects when combined with those of the Canadian tidal power project was stressed by numerous workshop participants. Special concern was expressed about their combined effects on tidal range.

PUBLIC PARTICIPATION PROGRAM
COBSCOOK BAY TIDAL POWER PROJECT

Eastport Workshop
The Tidal Power Concept, Local Concerns,
and an Introduction to the Study

Eastport Branch of the Bangor Savings Bank
May 31, 1978

Dr. Arthur Johnson led the discussion and Dr. Gordon Haaland served as recorder. A general introduction to the Workshop purpose was made by Dr. Haaland. Following this, Colonel John Chandler gave a general outline of the project and the role of the U. S. Army Corps of Engineers. He explained that the reason for this Plan of Study phase is the need for a good Environmental Impact Statement and the opportunity for some early work on engineering design. He reported that Canada has officially noted that it is not interested in pursuing an international project at this time, making the project entirely a United States operation in Cobscook Bay. The Colonel further noted that there is Congressional and Presidential interest and that the amount of planning dollars (over \$600,000 for the next year), represents a high level of interest. Although there has been some discussion at the Federal level of cost sharing by local areas for federal water projects, this has not yet been determined.

James Callahan of the U. S. Army Corps of Engineers, Project Director, provided some information on the specifics of this tidal power project. He noted that the Corps was re-evaluating all project designs and he outlined the various alternatives and options. The Plan of Study will include an evaluation of all reasonable alternatives except experimental alternatives, including comparisons on cost and environmental impact. The total cost for the ultimate project will be between \$200,000,000 and \$650,000,000 not including transmission lines costs.

The general process for planning a project such as this is as follows:

- Stage I - The preparation of a Plan of Study requiring six to eight months.
- Stage II - Formulating intermediate plans, approximately 18 months.
- Stage III - Refining alternative plans, an additional 24 to 30 months.

The purposes of the Plan of Study include (1) identifying specific study items, (2) assigning responsibility for various elements, and (3) establishing a budget and timetable.

From this point, Dr. Johnson led a discussion on matters of concern as identified by the participants from Eastport. A list of participants is included in this part of these minutes.

The following issues were discussed:

Project impact.

It is important that both the construction phase impact and the long term impact of the project be evaluated. The potential consequences for the local communities, both positive and negative, are great.

Regional politics.

The participants felt that the New England region must be involved in order for this project to develop. They expressed the belief that Congress does not have much concern for Eastern Maine.

Housing.

Housing does not now exist for the size of work force needed to build this project. In fact, Eastport is having some difficulty providing housing for the new boat building school opening this year. The housing which is developed ought to be of good quality, and not just a barracks, so that it might be useful in the future for tourism or other economic development schemes.

Employment.

This question was considered to be of crucial importance. Not only were questions raised about the availability of construction and long term jobs but also about the impact on existing businesses and wage rates. Some inflation on these is bound to occur and could prove troublesome. On the other hand, if new employers came to the area as a consequence of the project, it could be beneficial. Other economic benefits could come from improved transportation, tourism, and a possible short road link to Lubec.

Commercial fishing.

Although there are not many local people engaged full-time in commercial fishing, fish processing is important to Eastport. The possibilities of future fisheries must be examined, however, including mariculture and aquaculture.

Services.

It was understood that the construction phase would include the bringing in of needed professional services.

There was concern, however, about who would be responsible for the other needed services, such as sewage treatment, water, law enforcement, etc. This would need to be clarified for the local residents.

Local development.

The town of Eastport is currently studying the feasibility of a deep water port facility in Eastport. The impact of the tidal project on such a facility as well as on the proposed Pittston refinery and the Half Moon Cove tidal project must be examined.

Lifestyle.

There are potentially major changes that would occur if such a large project as proposed were built. While the participants were somewhat interested in the economic opportunities that the facility might generate, they were uncertain about the impact on the community, particularly on the style of life available to the residents.

Transportation.

There is considerable interest in improving transportation, including railroads, a small airport, and better highway access.

Involvement.

The participants agreed on the importance of local involvement in the planning phase, including persons from all the communities surrounding Cobscook Bay.

PUBLIC PARTICIPATION PROGRAM
COBSCOOK BAY TIDAL POWER PROJECT

Orono Workshop
Natural Resources and Environment Considerations
North Lown Room, Memorial Union
University of Maine at Orono
June 5, 1978

Opened at 9 A.M. with Dr. Gordon Haaland as Discussion Leader and Dr. Arthur Johnson as Recorder. A list of those present is attached.

Dr. Haaland opened the meeting with a summary of what the workshop was intended to accomplish. After each person introduced him or herself, James Callahan of the Corps of Engineers summarized the project and the Plan of Study approach. He was followed by Dr. Barrett of the Corps who elaborated on the requirements for the National Economic Development Plan and the Environmental Quality Plan.

Dr. Haaland then directed attention to the questionnaire relating to participants' evaluation of the importance of various environmental and resource areas. The results were as follows:

	<u>Highly Important</u>	<u>Important</u>	<u>Moderately Important</u>	<u>Unimportant</u>
Geology	2	9	1	0
Seismology	3	8	2	0
Hydrology	10	5	0	0
Soils and erosion	2	6	5	0
Water quality	8	3	3	0
Air quality	2	1	4	7
Aquatic, marine ecosystem	15	0	0	0
Terrestrial ecosystem	2	4	8	0
Mariculture, aquaculture	4	10	1	0

Dr. Haaland asked for additional categories and the following were suggested:

Recreation as water and resource-related	11	3	0	0
Commercial fishing	11	3	0	0

Based on these results, Dr. Haaland suggested that the group saw the following priority for study:

1. Aquatic, marine ecosystems
2. Commercial fisheries
3. Hydrology
4. Water quality
5. Geology, seismology, recreation, aquaculture.

Discussion, largely resulting from questions, followed. Specific questions included:

A. Aquatic, Marine Ecosystems

What changes in terrestrial systems will follow from location of dams?

Is the territorial ecosystem really separable from the marine ecosystem?

Comment The project would lower high water mark and raise low water mark.

Discussion There would be possible impacts on the "nursery" role of Cobscook Bay and effects on bird life. Title to "new" land would presumably rest in the owner of land, not the government.

What is the anticipated effect of Canadian tidal project?

Discussion Forecast 6-inch change in tide at Boston, but no really specific information.

Will impact studies be limited to U. S.? (Ans.: Yes. The Corps will reevaluate some 35 studies on Cobscook and do new ones.

Comment If tidal range is raised 5-6 feet, it might affect the seal population.

Summary The study of terrestrial ecosystems should be on a par with marine. In large measure the impacts of the project on Cobscook Bay will depend on dam location.

B. Commercial Fisheries

What will be effect on specific fisheries?

Discussion Study should take into account scallops, blue mussels, shrimp, squid, alewives, herring, lobster, weir fisheries, clamming. In looking to future possibilities, green urchins, periwinkles, and worms should not be overlooked.

Would the project destroy "nurseries" for adult commercial fish?

Discussion This was identified as a key question. A representative of Suffolk University indicated they are studying this question now under an NSF grant. We must look to future potential on the basis of past records. We don't know enough about what goes on now in Cobscook Bay.

Summary

After we know how construction and impoundment configuration will affect the physical picture (e.g. tidal range and water quality), we will know much more about the biological (fisheries) impact. Among the things that should be considered are changes in:

1. Salinity
2. Maximum and minimum water temperatures
3. Sedimentation (change of bottom)
4. Current speed and direction
5. Access and egress for indigenous species

Related Discussion

Should the Corps have a physical model for the project?

Discussion

There has been very good luck with a computer model relating to Sheepscot River, done by James Fay of MIT in connection with Maine Yankee Atomic project. This suggests a physical model is not always necessary.

What will be the effect of turbines on fish at various stages of development? (re ingress and egress)

Discussion

Answer will hinge on size, type, speed of turbines.

Will there be provision for accommodating tankers serving any Pittston refinery development?

Discussion

This matter will be studied.

What will be the project's effect on bird life--migratory, seabirds, endangered species like Bald Eagle?

Discussion

This will be studied. It may require an ecological simulation model that will cover temperature and other changes over the life cycle of the project.

C. Hydrology

Will seasonal run-offs from rivers in the area be affected? How about ground water and ground water table?

Discussion

Doubtful that seasonal run-offs will be affected. Probably no slowdown. Specific effects could be affected by the type of pool (one- or two-pool) system adopted.

What is the relationship between the Canadian tidal power project and effects on tides at Cobscook Bay and along the U. S. Coast?

Discussion

Combined Passamaquoddy and Cobscook projects will probably have a 1-2% effect on Bay of Fundy and perhaps 6-inch tidal effect at Boston. The Canadian project would have some effect at Cobscook but probably minimal. Solid information not available at this time.

One participant asked if Canadians could be minimizing the reported tidal effects of their proposed project on U. S. shores. Study of present tidal range shows it moves from 6-8 feet at Boston to 10 feet at Blue Hill Bay to 18-19 feet at Cobscook. Effects could be serious.

Will a project in Cobscook Bay have any significant offshore effects?

Discussion

The primary effect would probably be through its role as a fish "nursery." It is unlikely that it would have significant effects on sedimentation, current, temperature and the like in the Gulf of Maine. It would probably be worthwhile to construct a model including the Canadian input to see what the possible impact of both projects might be. Ken LeMay at UMO has an interest in this kind of modelling.

What will be effect of physical changes on climate? If the water warms, would it reduce fog in the area?

Discussion

Climatological changes, short- and long-run, deserve investigation.

Summary

Hydrology study should cover substantially the same things as aquatic, marine environment-- sedimentation, salinity, temperature changes, overall water quality; transfers from territorial to aquatic environment; effects of diminished flushing from Cobscook on existing species; current effects in Head Harbor Passage.

D. Geology and Seismology

Does the project have to be concerned about earthquake potential?

Discussion

The past record should be studied. Bay of Fundy is a Triassic Basin similar to one in New York where a nuclear plant was built on a fault. A recent issue of Science suggests that fault danger may be greater than generally appreciated. In fact, there has been fault quake activity in the Lubec area within the last 10 years.

There is a lot of information available. Machias has a station in the seismic net; there is (or may be) one at St. Andrews. Quakes potential is not nearly as serious with this project as with a nuclear plant or even Dickey-Lincoln due to the lower head of water that might be released.

Will the Study look at the impact of the "fill" source for dams?

Discussion Yes. Based on 1930's experience, this is probably not a major problem. Excavation for power houses provided all the fill that was needed and left a surplus.

Who will have title to land created or destroyed?

Discussion Based on Great Pond's experience in Maine, title will probably remain vested in owner of existing land. State owns from low water mark.

Summary Geology and seismology important but probably not to same degree as in the Dickey-Lincoln project.

E. Aquaculture

Discussion Study of the potential for mariculture and aquaculture should not be federal responsibility. Once the federally-sponsored study of the geology and physical outline is done, private parties should look into these economic potentials. Seaweed products might offer possible commercial potential. Temperature changes in water could affect mariculture substantially. Study should look at marine, anadromous and catadromous species.

Dam would probably help fixed gear mariculture (e.g. slow down current velocity and tidal range). Sea ice a threat to gear. Reservoir might act as nutrient pool. There is significant time frame: construction period and then impact of resulting facility.

Questions What will be the effect of sedimentation in the water over 7-8 year construction period?

What will be effect of construction on air quality?

What will be the effect of blasting during construction period on fish and birds?

What will be the effects of noise pollution?

Summary

Physical probing and establishing what is now biologically in Cobscook Bay will help to give mariculture answers. Must look separately at impact of construction period and then long-term facility. Water temperature and quality are keys to what can be done in mariculture. Sea ice is a very important factor when considering success of mariculture. Ice can destroy gear and cause mortality. This is well worth studying in terms of project configuration.

PUBLIC PARTICIPATION PROGRAM
COBSCOOK BAY TIDAL POWER PROJECT

Augusta Workshop
Energy Alternatives

Augusta Civic Center
June 7, 1978

Energy Alternatives

Dr. Arthur Johnson led the discussion and Dr. Gordon Haaland served as recorder. Dr. Haaland introduced the concept of the workshop and explained the goals of the workshop. Following this introduction, James Callahan of the U. S. Army Corps of Engineers reviewed the entire Plan of Study concept and the current status of design and preparatory work for the Cobscook Bay project.

In response to general questions as a first part of the workshop, Mr. Callahan noted that:

- (a) the power generated will go to preference customers since that is currently the law.
- (b) the question of how energy alternatives are defined will be a matter of discussion and is an area where people who are interested can attempt to help define the scope of the Plan of Study.
- (c) the Department of Energy has responsibility for transmission lines and marketing the electricity.
- (d) the Corps would report a life cycle analysis to Congress on the Cobscook Bay project.

The participants added a few general observations:

- (a) a general question was raised concerning the way in which the Cobscook Bay plan would relate to the larger energy plan for the region. It was considered important by some participants that the larger plan be considered with regard to Cobscook Bay.
- (b) there was a concern that other work that the Corps of Engineers is doing might affect what this project would be, particularly with regard to Dickey-Lincoln.
- (c) concerning alternatives, it was noted that one should predict not only the cost of fossil fuels but their relative availability. In this conjunction it was noted that the Hardy-Whitman Index to Cost Fuel Increases might provide some basis for comparisons.

In response to a series of general questions which had been submitted to the participants prior to the workshop, the participants essentially agreed on the following:

- (1) The question of the load growth for electric power in New England over the next 20 years would be a very important matter for a Plan of Study to include.
- (2) The alternatives that should be considered include nuclear, petroleum, solar, coal, wood, Canadian tidal, small hydroelectric plants, load management, energy storage, conservation, solid waste and gas.
- (3) The question was raised whether or not there are technical dimensions which need to be tested by a project such as this, or whether or not the technology in fact does exist. A decision ought to be made, therefore, whether this is a demonstration project or would become an integral part of NEPOL. The Corps ought to have this option. Another possibility would be to use the Half Moon Cove project as a demonstration for Cobscook Bay.
- (4) The group generally agreed that it would be important to determine whether a large scale tidal project is a cost effective contribution to solving some of New England's long term energy problems. With regard to comparisons with other alternatives, this group of participants did not see much importance in a physical model. Computer studies were viewed as cheaper and possibly even more effective. In addition, there was a sense that alternatives and their availability ought to be examined with respect to which sources of possible power might be displaced by a tidal project, and the purchase of Canadian tidal power ought to be considered as a viable alternative. This is primarily because of the potentially larger and thus more efficient project available in the upper Bay of Fundy.
- (5) As a brief aside, Dr. Harold Young, UMO, discussed wood as an alternative. He noted that by using residuals from wood production we could provide 50% more energy than is currently being produced by all of the power companies and paper companies in the State. This involves using the whole tree with the most valuable parts going to lumbering operations and forest products and the remainder serving as a biomass energy source. There were some questions raised, however, about the efficiency of this type of material. There was some question about what the net energy balance on wood as fuel would actually be, given the cost of transportation, utilization, and storage handling of it. It was suggested that there may be other more valuable uses to wood. It was also noted that the price comparisons of alternatives ought to include a comment on environmental costs as well.

- (6) It was generally agreed, although this was not considered a crucial question, that the Federal government had a role in meeting New England's long-term energy problems.
- (7) The Corps was encouraged to provide good cost estimates of the project, including costs of transmission lines, since the costs of transmission would necessarily be large for the Cobscook Bay project. A question was also raised as to whether other energy sources might be precluded by the development of Cobscook Bay.
- (8) It was noted additionally that alternative and concurrent uses of Cobscook Bay ought to be included in any Plan of Study.
- (9) There was a question about whether or not energy would be the best use of the Cobscook Bay resource and a recognition that there is a need to develop some standard guidelines for the relation between environmental impact and energy values. This is a crucial issue for all agencies (private, Federal, and State) involved with energy development.
- (10) A question was raised about the value of tidal energy as a periodic function. Some participants suggested that this should average out over time, but others felt that the periodicity of tidal power might be a problem regardless of re-timing. Since energy is of different economic value at different times of the day, there was a question about the over-all efficiency of tidal power. Tidal power was generally viewed, however, as a desirable substitute for fossil fuels.
- (11) There was a question raised about whether or not Maine should be a net supplier of power to other states. Given the current laws, it is not clear whether the local area will be able to benefit from a public power project.
- (12) A very important question was raised whether or not the project could be a Federal, State, and private joint venture. James Callahan of the U. S. Army Corps of Engineers asked that this question be transmitted directly to him. It was suggested that representatives of the two major utilities at the meeting, Central Maine Power and Bangor Hydro, formally transmit this request to the Corps.

PUBLIC PARTICIPATION PROGRAM
PASSAMAQUODDY-COBS COOK BAY TIDAL POWER STUDY PROJECT

Portland Workshop
Socio-Cultural Considerations

Center for Research and Advanced Studies
University of Maine at Portland-Gorham
June 9, 1978

Dr. Gordon Haaland led the discussion and Dr. Arthur Johnson acted as Recorder. The meeting opened with a brief introduction by Dr. Haaland followed by introductions and a short discussion of the project by James Callahan of the U. S. Corps of Engineers. There were 16 participants aside from Corps representatives and Drs. Haaland and Johnson. The list is attached.

Discussion was initially focused on a questionnaire distributed in advance. Views were solicited with respect to the following time frames: (a) during construction and (b) after completion of the facility. Answers were given as:

- 1 = highly beneficial
- 2 = beneficial
- 3 = no impact
- 4 = problem
- 5 = serious problem

Perceived Importance

Category	Construction					Most Important	Completed Facility					Most Important
	1	2	3	4	5		1	2	3	4	5	
Housing	0	4	0	6	2	X	3	4	2	1	0	
Cultural resources												
historic archaeology	0	3	1	5	3		0	2	3	4	0	X
Social structure	1	2	0	4	5	X	0	4	3	3	1	X
Recreation	1	3	1	5	1		3	2	1	3	1	
Aesthetics	0	0	1	5	3		0	2	4	3	2	
Noise	0	0	6	3	1		0	0	9	0	0	
Work force, employment	4	8	0	1	0	X	1	9	1	1	0	
Inflation, local	0	0	2	8	2		0	1	9	2	0	
Local government & public services	0	2	0	5	4	X	0	3	1	2	2	X
Transportation	0	2	0	7	1		0	10	1	0	0	
Role and rights												
Native Americans	0	1	0	4	5		0	4	0	6	1	
Land & Sea Use	1	0	1	6	4	X	0	2	0	7	3	X
Indus. Development & goods & services	1	2	6	2	0		2	9	2	0	0	
Treaty relations with Canada	0	1	5	4	0		0	2	6	4	0	

Informational Questions Raised at Beginning of Meeting

1. What is the relation of this project to Dickey-Lincoln?
Ans.: It will be evaluated independent of Dickey-Lincoln.
2. What will be the size of construction work force?
Ans.: About 2500.
3. What will be the effect of the project on tidal range?
Ans.: This is a matter that will be carefully investigated.
4. Did Stone & Webster do a study of the potential project?
Ans.: Yes, but it was a limited one.
5. What would be relation of the project to Pittston refinery if approved and built?
Ans.: This is a matter that will receive attention. It is quite possible that the requirements for the refinery could be compatible with an all-US project.
6. Where will construction materials be obtained and how will they be moved?
Ans.: We have good knowledge of local sand, gravel, etc. Other materials will probably be moved by water.

Discussion based on Questionnaire

A. Land and Sea Use

This is probably the key to most questions since it affects the basic economy of the area such as fishing.

1. Question: What will be the effect of tidal range changes on area occupations?

Discussion: Discussion was similar to that in the Natural Resources Workshop. Clams were especially mentioned. It was pointed out that handling in Passamaquoddy Bay is still important part-time occupation. Further, while impacts in one line of marine employment might be minor, due to multiple employment of local people, the total impact might be significant.

2. Question: What will be the effect on area property values and land use?

Discussion: Economic effects in terms of employment and income will probably be positive. It was suggested TVA experience might provide insights on this question.

3. Question: Will the project have positive or negative effects on the area standard of living?

Discussion: Economic effects in terms of employment, income probably positive. It was suggested TVA experience might provide insights on this question.

4. Question: What are the legal impacts of this project?

Discussion: Land use rights may be affected. Access to the shore is a case in point.

5. Question: Will increased recreational boating be a possibility?

Discussion: There appears to be increased activity in Whiting Bay now. Impoundment might create better recreational boating conditions.

6. Question: Will the project create aquaculture possibilities?

Discussion: This is a good possibility and will be investigated.

B. Work Force and Employment, Local and Regional Impacts

- Questions:
1. What percent of construction force will be hired locally?
 - a. Who will do the work, contractors or Corps?
 - b. If contractors, can they be required to hire a certain percentage of workers locally?
 2. Will training be provided for local workers? If so, will their higher skill level cause them to leave the area after construction is completed? (It was noted that only about 100 federal employees would be required to operate the completed facility.)
 3. What will be the impact of construction wages on local and regional wage rates?
 4. Will unionization be promoted as a result of the construction phase which might employ union workers?
 5. What types of industry and services might be attracted to the area as a result of the possible availability of power?

- a. What are the assets and liabilities of the area in attracting industry, assuming power would be available as a result of the project?
 - b. What will be the benefits of the project to Maine outside the Cobscook Bay area? Who will be getting the power? (i.e. Will Southern New England reap the benefits?)
6. What will be the effect on the composition of the area population (e.g. age distribution) and on the occupational structure?
- a. How will area residents perceive the project?
 - b. If the project blocks access to the sea, will it destroy their independence?
 - c. Will it threaten those who chose to live in the area because it is isolated, quiet, etc.

Discussion: The basic assumption of the workshop group appeared to be that the source and amount of income are key determinants of land use, social structure, and the like. One point of view was that people now in the area are there by choice and would regard the project as threatening. Another point of view was that the economic benefits of the project would be regarded favorably as offsetting changes required in lifestyles. There was concern expressed that the state might not benefit from the power and that providing 100 jobs long run would not be an adequate offset to costs and changes in the area necessitated by the project. If states participate in funding water projects, as currently under discussion, Maine might be able to insure that it gets proportionate benefits.

C. Social Structure and Government Services

1. Question: Won't decisions on how construction force will be accommodated have major effect on social structure and demand for government services?

Discussion: There appear to be two major choices--either integrate the construction force housing, etc. with the local community or segregate the work force. If the latter, it might take the form of a "trailer/mobile home city" which would be removed after construction is completed. Eastport people suggested the desirability of better quality, permanent housing

that might be used by local people and for tourists after construction. A third possibility suggested at this meeting is that large, old houses be converted back to their original function as boarding houses. The way in which the construction force is handled appears to be a key to both short- and long-run socio-cultural impact of the project.

2. Question: What kinds of local governmental problems will the project create?

Discussion: As a corollary to question 1 above, it was noted that major problems of law enforcement might accompany injection of a large work force into the area. This led, among other things, to the suggestion that there might be interesting possibilities for regional cooperation or even regional government.

D. Industrial Development

1. Question: Will multiple uses for dams be investigated?

Discussion: Among other things, there is a possibility of reducing driving time between Eastport and Lubec by road across dam. What would be effects on each community as a result?

2. Question: What types of industry might be attracted as a result of the project?

Discussion: [See B5 above.] Would the availability of power and economics of water transportation encourage development that might make the area an industrialized one? This is a possibility that should be studied.

E. Historic Archaeology

Prior workshops have suggested that Cobscook Bay is probably a unique marine resource. Is the area unique in other ways?

- Observation:
1. The Eastport area has some relatively unique 19th century characteristics. It has changed little over the past century. There is good material from structural remains on how fishing was conducted in the past.
 2. This is an area of rather unique cultural interface between Canada and the U. S.
 3. The real uniqueness of area relates to relatively unchanged lifestyle. This observation led to a discussion of tourism.

Question: Why do tourists come to Maine? Will present patterns change in the future?

Discussion: Maine's uniqueness as an economically under-developed state of great natural beauty is its chief attraction for tourists. People come here because they want to see what cannot be seen in more developed states. In this sense unchanged lifestyle is a positive economic asset. The nature of tourism is already changing; group visits (e.g. bus tours) are replacing the family visit; tourists tend to be older people with the time and money to take such trips.

Comment: While the project may attract tourists, there will be an opportunity cost in the sense that some of the uniqueness that has been the basis of present and past tourist visitation will be lost.

4. The area is unique in its relationship to native Americans.

F. Overall

The Plan of Study should:

1. Investigate socio-cultural impacts from the standpoint of the effects of changes in sources and amounts of income locally available as a result of the project. Such investigation should pay particular attention to the fact that area residents derive income from multiple employment which is heavily dependent on the unique character of the local marine environment.

Recommendation: An attitudinal survey of area inhabitants should be included.

2. Investigate alternative ways of accommodating the construction work force since the way it interacts with the local population will have a significant impact on changes in the socio-cultural environment.
3. Examine the pluses and minuses of each major issue. For example, if traditional fisheries are destroyed, can that loss be offset by aquaculture? Is attraction of a different type of tourist than present and past a net gain for the area if it is at a cost of a chosen lifestyle?
4. Examine alternative methods of local governmental cooperation as a means of coping with problems created by the project.

5. Examine ways of maximizing local benefits from the need to provide housing for construction workers.
6. Explore possibilities for employing as many local residents as possible and ways of utilizing their improved skills after construction is completed.
7. At least suggest what industries might, given area assets and liabilities, realistically locate in the area if power were available at favorable rates.
8. Delineate possible local-state-federal relationships in the generation, transmission, and utilization of power from the project.

PUBLIC PARTICIPATION PROGRAM
COBSCOOK BAY TIDAL POWER PROJECT

Boston Workshop
Economic Factors
President's Office, University of Massachusetts
June 12, 1978

The workshop on economics began at 1:30 with Dr. Gordon A. Haaland introducing the workshop purpose and Dr. Arthur M. Johnson serving as discussion leader. Colonel John Chandler of the U. S. Army Corps of Engineers presented the general aspects of the proposed project including a brief history and review of its current status. Mr. James Callahan, Corps of Engineers, discussed the details of the project itself.

Dr. Arthur Johnson led the discussion and outlined three major factors for consideration:

1. Project economics, or the cost of the construction and operation.
2. Energy economics, or the relative economic advisability of this project when compared to alternatives and future need.
3. Economic impact, or the value to the region of the construction and operation of the project.

Project Economics

The costs of the project were outlined by the Corps of Engineers. Project costs vary from 250-600 million dollars, depending on ultimate size. There was some discussion that consideration be given to capital structure, repayment schedule, and the impacts on tax rate.

There were a number of specific issues raised by the participants with regard to Project Economics. In response to the question on the navigational lock and its relationship to the Pittston Refinery Proposal, the Corps noted that they had been in touch with Pittston with regard to possible sites and alternatives. It was also noted that the relationship between the Project Economics and the economic impact on the region ought to be part of the decision of whether or not to build. Within the current guidelines for projects of this sort, it was noted that regional benefits may be displayed as part of Project Economics. This currently is a political question, however, and the executive branch of the Federal government does not like to use this form of justification.

Energy Economics

The most important discussion involved the various methods of analyzing future need for energy and the economic viability of this project. Four areas were identified for major discussion.

1. Benefit/Cost Ratio. The BC Ratio is based on the current allowable Federal Interest rate of 6 5/8%. At this rate, the project does not appear to be economically viable, since the ratio is less than one. This, however, led to a discussion of alternative economic analyses.
2. Alternative Economic Analyses. The primary alternative considered was life cycle costing. In this analysis, the potentially rising cost of fuels (e.g. oil, coal, nuclear) for alternative power generating facilities are considered over the life-time of this tidal project. Since fossil fuels are expected to increase in price substantially, tidal power becomes more economically attractive since operating costs are relatively constant.

There were several problems noted with this method, however. For example, changes in technology may make other alternatives more attractive (e.g. solar) and thus the project may continue to be relatively uneconomic. Also, current life cycle costing is only looking at fuel inflation, assuming inflation in this sector to be more severe than in other sectors of the economy.

The advantage of sea water as a source of energy is that it is a resource for which one does not have to pay. Thus operating costs for a tidal power project are low relative to other types of power generation. This is important given the assumption that fuel costs will increase at a much more rapid rate than prices in other sectors of the economy.

The whole issue of forecasting prices a decade and more in the future was the subject of considerable skepticism. It was noted that the various confidence levels for forecasts over 20, 30, 40 years ought to be considered. The further out in time, the less confidence can be placed in predictions.

3. New England Grid. The participants also recommended that the role of this tidal project be carefully considered within the New England regional energy picture, particularly with regard to its operation as a source of base load, intermediate, or peaking power capacity. There was considerable discussion, consequently, about the relationship of tidal to the NEPOOL system.

There was substantial agreement among the participants that the analysis should be done looking at the NEPOOL system with the tidal power and without tidal power. The real benefit of a tidal power project would be clearer with such an analysis available.

Questions were raised about the dollar value of the power from this project and the relationship of the re-timing of power within the grid. There was some discussion and agreement that the basic importance of tidal power will be energy-savings, not in base load capacity. There was no real agreement among the participants, however, about how to place a value on energy savings versus basic capacity. Perhaps the major benefit of this project would be to slow down the existing fossil or nuclear fuel use and to defer construction of new fossil or nuclear plants.

It was noted that some projects which are uneconomic given current prices may, as a result of continuing inflation and escalation of fuel prices, be economic in ten years. In this context, it could be more economic to defer construction of a tidal project for some length of time.

The Department of Energy is projecting a major decline in the use of oil for electrical generation. In predicting costs and benefits of electrical generation by alternative means, projections ought to be based on a mix of generating systems, not just comparing one system (e.g. oil) against tidal power.

NEPOOL is not considering oil as a viable alternative for the future, thus comparisons for tidal power are more properly made with coal and conventional nuclear. Both of these will show real price increases in operating costs over time. However, in the case of nuclear power, the development of breeder reactors may change that picture.

4. Financial Feasibility. The discussion of financing indicated that three factors must be considered - the capital structure, the repayment schedule, and the tax rates.

The project is expected to be able to pay for itself provided fuel costs escalate more rapidly than general inflation and provided that a technological development does not provide electricity as cheaply as is possible today. As noted above, the future market for power in New England and the type of power produced has an impact on the repayment schedule, since there must be an interest on the part of preference customers and

public utilities to purchase this power (it must fit the needs of the users). The possibility of the sale of power to private utilities would have a major impact on marketing.

Discussion on life-cycle costing also raised questions about comparisons based on a return on investment. This was thought to be best handled by the current discount rate. The current recommendation of the Corps is that the dollars for this project will be discounted for 50 years rather than 100 years.

The question was raised, as it had been in the Augusta Workshop, about whether or not joint funding would be possible, involving private, State, and Federal dollars. There was a general sense that the comparisons made in an economic study of the tidal power project should include some of the problems that private utilities would face, including corporate income taxes.

Economic Impact

The economic impact a tidal project such as this was viewed as substantial on the local and regional economy but not very important for New England as a whole. The economic impact will be most substantial during construction, and has both positive and negative local consequences.

Other Comments

It is recommended that a Benefit/Cost Ratio analysis be done on the navigation lock itself.

There was some discussion about the life-span of the dams and other facilities resulting in the recommendation that the Corps consider alternatives other than 100 years as a benchmark. The Plan of Study ought to be used to establish a reasonable life-time frame, which is likely to be shorter than 100 years.

It was suggested that the Corps should consider a series of small projects as an alternative to a large Cobscook Bay one. It was argued that this approach would have the advantage of being a demonstration with minimal social-cultural impact and permit the development of some special technology.

It was noted that it might be useful to couple the Cobscook Bay project with the Dickey-Lincoln project. This was an earlier plan for this project but was separated in the 1965 approval of Dickey-Lincoln. It might prove useful to consider this project with and without Dickey-Lincoln.

PASSAMAQUODDY - COBSCOOK BAY REGION WORKSHOPS

Eastport Workshop - May 31, 1978

The Tidal Power Concept, Local Concerns,
and an Introduction to the Study

<u>Name</u>	<u>Address</u>
Chester E. Allan	Retired
B. E. Barrett	U. S. Army Corps of Engineers
James C. Bates, M.D.	Physician - Eastport
James E. Callahan	U. S. Army Corps of Engineers
Col. John Chandler	U. S. Army Corps of Engineers, NED
Merrill Conti	Fire Chief - Eastport
Winifred French	Editor & Publisher "Quoddy Tides" - Eastport
John Pike Grady	Quoddy Tides Foundation - Eastport
Gordon A. Haaland	U. of Maine at Orono - Orono
George Harris	Eastport
Arthur M. Johnson	U. of Maine at Orono - Orono
Dr. Norman Laberge	Half-Moon Cove Tidal Project - Pleasant Point Reservation
Russ Lawson	Half-Moon Cove Tidal - Passamaquoddy Tribe
James Logan	Division Manager, Bangor Hydro Electric
Harry A. Richardson	Eastport
Andrew M. Seeley	Manager, Bangor Savings Bank - Eastport
Gordon E. Torrey	Consultant, City of Eastport
David B. Turner	Eastport City Council
Harry L. Vose	President, Eastport City Council

PASSAMAQUODDY - COBSCOOK BAY REGION WORKSHOPS

Orono Workshop - June 5, 1978

Natural Resources and Environmental Considerations

<u>Name</u>	<u>Address</u>
B. E. Barrett	U. S. Army Corps of Engineers
Bob Bayer	Animal Veterinary Sciences - Univ. of Maine at Orono
William Beardsley	Bangor Hydro Electric Company
Marvin F. Boussu	National Marine Fisheries Services
James Callahan	U. S. Army Corps of Engineers
Barbara Cettrell	State Department Conservation
Dick Clime	Dodge Cove Marine Farm - Newcastle, Maine
John H. Dearborn	U. of Maine at Orono - Zoology
Water S. Foster	Maine Department Marine Resources - Augusta
Matgie Lee Gallagher	U. of Maine at Orono - ANU, Lobster Project
Larry Grossman	U. S. Army Corps of Engineers
Terry Haines	U. of Maine at Orono - USFWS, Zoology
Bradford Hall	U. of Maine at Orono - Geology
Alan E. Hutchinson	Maine Dept. Inland Fish & Wildlife - U. of Maine at Orono, 202 Nutthing Hall
Arthur Johnson	U. of Maine at Orono - Orono
Thomas Kellogg	U. of Maine at Orono - Geology
Donaldson Koons	Colby College - Geology - Waterville
Robert MacKay	U. of Maine at Orono - Archaeology, Room G, South Stevens - Orono
Ann F. Mason	Maine Dept. Inland Fish & Wildlife
Michael Morse	Maine Dept. Inland Fish & Wildlife
Frank Roberts	U. of Maine at Orono - Zoology
David Sanger	U. of Maine at Orono - Archaeology, Room G, South Stevens - Orono
Arthur West	Cobscook Bay Lab.
Richard Will	U. of Maine at Orono - Archaeology, Room G, South Stevens - Orono
Bruce D. Sidell	U. of Maine at Orono - Zoology

PASSAMAQUODDY - COBSCOOK BAY REGION WORKSHOPS

Portland Workshop - June 9, 1978

Social-Cultural Considerations

<u>Name</u>	<u>Address</u>
James Acheson	Pemaquid Harbor, Maine 04560
Lawrence C. Allin	U. of Maine at Orono, 6 Coburn Hall, Orono
Edwin H. Bates	U. of Maine at Orono, Cooperative Extension Service, Winslow Hall, Orono
John Battick	U. of Maine at Orono, Dept. of History, 204 East Annex, Orono
Charles E. Bodman	U. of Maine at Machias, M/S Dept.
James A. Callahan	U. S. Army Corps of Engineers - 424 Trapelo Street, Waltham, Mass. 02154
Russ Conway	Half-Moon Cove Tidal Power - Eastport, Maine 04631
Joel W. Eastman	U. of Southern Maine, Dept. of History, Portland, Maine
Sandra Garson	Five Islands, Maine 04546
Sherry Huber	430 Blackstrap Road, Falmouth, Maine 04105
Bob LeBlanc	U. S. Army Corps of Engineers
Robin Peters	U. of Maine at Orono, Center for Marine Studies, 14 Coburn Hall, Orono
Steve Rubin	U. S. Army Corps of Engineers
Alvin H. Streeter	Energy Impacts Projects, M.I.T., Cambridge, Mass.
George Tibbetts	Office of Energy Resources, 55 Capitol Street, Augusta, Maine 04330
Richard Will	U. of Maine at Orono - Archaeology Lab., South Stevens Hall
James Wilson	U. of Maine at Orono - Dept. of Economics, 225 Stevens Hall, Orono
John S. Wilson	U. S. Army Corps of Engineers

PASSAMAQUODDY - COBSCOOK BAY REGION WORKSHOPS

Augusta Workshop - June 7, 1978

Energy Alternatives

<u>Name</u>	<u>Address</u>
William Beardsley	Bangor Hydro Electric Company - Bangor
William Bisson	Stevens Architects - Portland
Charles E. Bodman	U. of Maine at Machias - Machias
James Callahan	U. S. Army Corps of Engineers
Charles S. Colgan	Maine State Planning Office
Russell I. Fries	U. of Maine at Orono - Orono
Mary M. Gros	China 04926
Larry Grossman	U. S. Army Corps of Engineers
Gordon A. Haaland	U. of Maine at Orono - Orono
Philip C. Hastings	Central Maine Power Company
Thomas B. Hyde	The Jackson Laboratory - Bar Harbor
Arthur M. Johnson	U. of Maine at Orono - Orono
John Joseph	Office of Energy Resources
Normand Laberge	Half-Moon Cove Tidal Project
Bob LeBlanc	U. S. Army Corps of Engineers
Roland Patneaude	W. S. Libbey Co., Mill St. - Lewiston
Bruce Probert	Sprague Energy - Searsport - 04974
John B. Randazza	Central Maine Power - Augusta
George Tibbetts	Office of Energy Resources
David Wihry	Dept. of Economics, U. of Maine at Orono
Harold E. Young	Complete Tree Inst., U. of Maine at Orono, Nutting Hall - Orono

PASSAMAQUODDY - COBSCOOK BAY REGION WORKSHOPS

Boston Workshop - June 12, 1978

Economic Factors

<u>Name</u>	<u>Address</u>
George Antle	U. S. Army Engr. Institute for Water Resources
Paul H. Bedrosian	EPA, JFK Fed. Bldg. - Boston
S. L. Blum	Mitre Corp.
Richard F. Burns	USEPA, Fed. Bldg. - Boston
James E. Callahan	U. S. Army Corps of Engineers - Waltham
R. M. Campbell	Stone & Webster Eng.-Corp.
Col. John P. Chandler	U. S. Army Corps of Engineers - NED
Robert E. Chase	DOE Region I CS&RA
Charles S. Colgan	Maine State Planning Office
Thomas D'Avanzo	EPA - Env. Impact Office
Richard Denton	Shawmut Bank of Boston
W. E. Feero	DOE/EES
Antonio Ferreira	NEPOOL
Larry Grossman	U. S. Army Corps of Engineers - NED
Gordon A. Haaland	U. of Maine at Orono - Orono
Philip C. Hastings	Central Maine Power Co. - Augusta
Jonathan B. Hill	Markham & Hill (The Pittston Co.)
Joseph L. Ignazio	U. S. Army Corps of Engineers - NED
Arthur M. Johnson	U. of Maine at Orono - Orono
Judy Kany	Waterville (Rep. to Maine Legislature)
Normand Laberge	Half-Moon Cove Tidal Power Project
Bob LeBlanc	U. S. Army Corps of Engineers - Waltham
Peggy McDonald	Northeast Solar Energy Center
Kevin M. McMahon	U. S. Army Corps of Engineers - Waltham
David C. Major	Institute for Water Resources
Fred Nemergut	New England Regional Commission
Daniel Peaco	Mass. Energy Facilities Siteing Council
Steve Rubin	U. S. Army Corps of Engineers - Waltham
William D. Shipman	Bowdoin College - Brunswick
James R. Smith	NEPOOL
George Tibbetts	Maine Energy Office
W. W. Wayne, Jr.	Stone & Webster Eng.-Corp.

AUG 23 1977

New
England
Newspaper

AUG 22 1977

New
England
Newspaper

Bay tidal power interest rekindled

AUGUSTA, Maine (UPI) — The Depression-era dream of harnessing the tides of Passamaquoddy Bay to generate electric power has been rekindled by an Army Corps of Engineers study and an investigation by a federal energy agency.

Undertaken at the urging of Gov. James B. Longley, the Corps' preliminary and incomplete study is

negative, findings about financing the tidal power project.

The Corps used a method called "life cycle costing" to determine the feasibility of the project over several years. The method, although used in private industry, is not an accepted procedure of the Corps, a spokesman said.

"We are awaiting the decision of the Secretary of the Army on whether we can use this method. Without his approval, we can go no further on the project," the spokesman said.

A study commissioned by the U.S. Energy Research and Development Administration names Passamaquoddy Bay of Maine and Cook Inlet of Alaska as the only sites in the country where tidal power projects would be feasible.

The ERDA study, done by a Massachusetts consulting firm, shows an economic break-even point at the Passamaquoddy Bay power project could be reached within 13 years.

The consulting firm's report concluded: "The detailed economic analysis made as part of this study indicates that reasonably anticipated rises in the costs of fuel for alternative oil or coal fired steam electric plants would more than compensate for the initially high tidal investment costs."

If the project was located entirely within Maine, the construction cost would be about \$500 million, with a 250-megawatt capacity. An international project would cost nearly \$3 billion, with a capacity of 1,250 megawatts, the report stated.

Because the Canadian government appears committed to constructing a 2,500-megawatt tidal power system in the Bay of Fundy, the report said the plan to build in Maine would be preferable.

In his request to study the project, Longley asked the Corps to compare the cost of Passamaquoddy tide power with nuclear, coal, oil-fired and river (hydroelectric) power.

Longley told the Corps, "We need to know, from a power cost standpoint, the value of Quoddy in 10 or 20 years with the fuel costs of other types of power rising."

NASHUA TELEGRAPH
NASHUA, NH.
U. S. A.

AUG 22 1977

New
England

Study Says Tidal Power Is Feasible in Maine Bay

AUGUSTA, Maine (UPI) — A study commissioned by the U.S. Energy Research and Development Administration calls Passamaquoddy Bay of Maine one of only two sites in the country where tidal power projects would be feasible.

The study shows an economic break-even point at the Passamaquoddy Bay power project could be reached within 13 years.

The other area cited in the study was Cook Inlet in Alaska.

"The detailed economic analysis made as part of this study indicates that reasonably anticipated rises in the costs of fuel for alternative oil or coal fired steam electric plants would more than compensate for the initially high tidal investment costs," ERDA's consulting firm report concluded.

The report stated the construction cost for a facility, with 50-megawatt capacity, located entirely within Maine would be about \$500 million. It said an international project would cost nearly \$3 billion, with a capacity of 1,250 megawatts.

Because the Canadian government appears committed to constructing a 2,500-megawatt tidal power system in the Bay of Fundy, the report said the plan to build in Maine would be preferable.

In other research into the proposal, preliminary figures from an Army Corps of Engineers study contradict the Corps' earlier, negative, findings about financing.

Undertaken at the urging of Gov. James B. Longley, the Corps study used a method called "life cycle costing" to determine the feasibility of the project over several years.

Longley had asked the Corps to compare the cost of Passamaquoddy tidal power with nuclear, coal, oil-fired and river (hydroelectric) power.

FALL RIVER HERALD
NEWS
FALL RIVER, MA.
D. 42,157

SUN CHRONICLE
ATTLEBORO, MA.
D. 18,000

AUG 22 1977

New
England
Journal

AUG 22 1977

New
England
Newspaper

Favor Quoddy For Tidal Power Project

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The report stated the construction cost for a facility, with 250-megawatt capacity, located entirely within Maine would be about \$500 million. It said an international project would cost nearly \$3 billion, with a capacity of 1,250 megawatts.

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CAPE COD TIMES
HYANNIS, MA.
D. 27.726

AUG 22 1977

New
England
Newsclip

Maine bay suitable for tidal power project, study shows

AUGUSTA, Maine (UPI) — A study commissioned by the U.S. Energy Research and Development Administration calls Passamaquoddy Bay of

Maine one of only two sites in the country where tidal power projects would be feasible.

The study shows an

economic break-even point at the Passamaquoddy Bay power project could be reached within 13 years.

The other area cited in the study was Cook Inlet in Alaska.

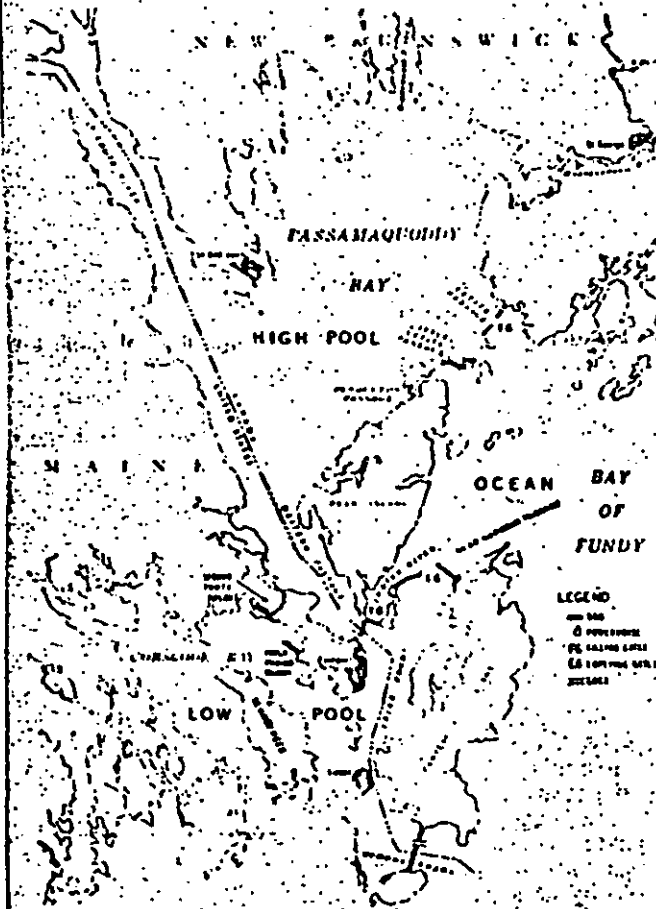
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Undertaken at the urging of Gov. James B. Longley, the Corps study used a method called "life cycle costing" to determine the feasibility of the project over several years.



(UPI)
A U.S. energy panel study has said that Passamaquoddy Bay in Maine is one of two sites in the country that would be feasible for construction of a tidal power project. An Inlet in Alaska is the second possible location.

OCE - N 12 7

• 'Quoddy pushed instead of Dickey

BANGOR DAILY NEWS
BANGOR, ME.
AUG 23 1977

New
England
Newspills

AUGUSTA, Maine (UPI) — A bipartisan group of legislators is pushing for the Passamaquoddy tidal power project on the grounds it would be a viable alternative to construction of the Dickey-Lincoln hydro-electric project.

A preliminary study by the U.S. Army Corps of Engineers says the tidal power proposal is economically feasible if its costs are projected over the life of the project and compared with alternatives such as electricity generated by oil, coal or nuclear plants.

The lawmakers who support the Passamaquoddy project, which would harness the tides of Passamaquoddy Bay, include House Minority Leader Linwood Palmer Jr., R-Nobleboro, and the House chairmen of the Joint Standing Committee on Energy and the Public Utilities Committee.

The Dickey-Lincoln project would flood about 88,000 acres of land along the St. John River in northern Maine to generate electricity by use of a series of dams.

"I'm not happy with the Dickey-Lincoln project," Palmer said. "I have felt for a long time that, if the (Passamaquoddy) project is

is feasible, and it seems to be, we should go with it.

"The Dickey-Lincoln project would be costly in terms of the loss of good natural resources," he said.

Rep. Richard Davies, D-Orono, House Energy chairman, said he was excited at the new corps report, prepared at the request of Gov. James B. Longley.

"The Quoddy project would harness the tides to generate power with little environmental impact," Davies said, "and that alone places it higher than Dickey-Lincoln on my list."

Davies said his committee will be studying the state's energy policy before the legislature reconvenes in January and will take a close look at the tidal power plant concept.

Sen. Howard Trotzky, R-Bangor, Senate chairman of the committee, said he's happy about the report but wants to fully study tidal power in comparison to nuclear power before commenting.

Rep. Edward Kelleher, D-Bangor, chairman of the Public Utilities Committee, stressed there would be no fuel costs because the tides would provide a constant source of energy.

"The amount of energy that could be produced down there could more than sufficiently take care of our needs," Kelleher said, "as well as supplying power to areas outside of the state."

The corps report was supported strongly in a study of the project by the Boston consulting firm of Stone and Webster, which concluded the project will be economically feasible after 13 years of operation, because of increasing costs of alternative sources of energy.

"The detailed economic analysis made as part of this study indicates that reasonably anticipated rises in the cost of fuel for alternatives would more than compensate for the initially high tidal investment costs," the report concluded.

LAWRENCE EAGLE
TRIBUNE
LAWRENCE, MA.
Q. 48,000

AUG 23 1977

New
England
Newspills

Power project pushed

AUGUSTA, Maine (UPI) — The Passamaquoddy tidal power project is being pushed by a bipartisan group of state legislators who see it as an economically feasible alternative to the Dickey-Lincoln hydroelectric project. House Minority Leader Linwood Palmer Jr., R-Nobleboro, and the House chairmen of the Joint Standing Committee on Energy and the Public Utilities Committee said they are encouraged by a preliminary study by the U.S. Army Corps of Engineers.

Passamaquoddy Called Feasible For Tidal Power

AUGUSTA, Maine (UPI) — A study commissioned by the U.S. Energy Research and Development Administration calls Passamaquoddy Bay of Maine one of only two sites in the country where tidal power projects would be feasible.

The study shows an economic break-even point at the Passamaquoddy Bay power plant could be reached within 1 year.

The other area cited in the study was Cook Inlet in Alaska.

"The detailed economic analysis made as part of this study indicates that reasonably anticipated rises in the costs of fuel for alternative oil or coal fired steam electric plants would more than compensate for the initially high tidal investment costs," ERDA's consulting firm report concluded.

The report stated the construction cost for a facility, with 250-megawatt capacity, located entirely within Maine would be about \$500 million. It said an international project would cost nearly \$3 billion, with a capacity of 1,250 megawatts.

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Undertaken at the urging of Gov. James B. Longley, the Corps study used a method called "life cycle costing" to determine the feasibility of the project over several years.

Longley had asked the Corps to compare the cost of Passamaquoddy tidal power with nuclear, coal, oil-fired and river (hydroelectric) power.

Longley told the Corps, "We need to know, from a power cost standpoint, the value of Quoddy in 10 or 20 years with the fuel costs of other types of power rising."

HOOR
NORWALK, CT.
D. 22,500

AUG 23 1977

New
England
Newspapers

45625 127

New
England
Newspaper

(It's There Regardless Of Price Whims)

Quoddy's Throb 'Needed

WALTHAM, Mass. (UPI) — New England eventually is going to need a tidal power facility at Passamaquoddy Bay in Maine, but it cannot be considered a regional alternative to the proposed Dickey-Lincoln hydroelectric project, according to the New England head of the U.S. Army Corps of Engineers.

"Passamaquoddy cannot replace Dickey-Lincoln as a peak power facility," Col. John P. Chandler said in an interview. "If you look at what Maine needs, Passamaquoddy looks good to Maine."

Chandler said Dickey-Lincoln is being considered to supply power to New England when there is high customer demand for electricity. He said besides providing power to Maine, Dickey-Lincoln could meet about 17 per cent of New England's peaking power needs.

New England eventually is going to need to take advantage of Passamaquoddy Bay's tidal power to generate electricity because such a source is not dependent on fluctuations in market prices, like oil or coal, Chandler said.

"I encourage the pursuit of Passamaquoddy — I see it as a renewable New England resource," Chandler said. "But right now, we don't even have the option to do a full-blown

study."

Normally, the corps does a detailed study of projects after Congress appropriates the money for such an analysis.

Dickey-Lincoln originally was conceived as a complementary project to Passamaquoddy, Chandler said. Passamaquoddy's power output would fluctuate daily with the tide, and Dickey-Lincoln could have been used to fill in the "troughs" in the tidal

project's generation of electricity.

Chandler said it became clear that Dickey-Lincoln could be used to help out regionally during peaks of customer demand, instead of being used to fill in the low production periods of Passamaquoddy.

He said a tidal project could not be used to meet peaks in "human need" because it is impossible to time the tides to meet the need for peaking power.

GLOUCESTER DAILY
TIMES
GLOUCESTER, MA.
D. 11,608

AUG 25 1977

New
England
Newsclip

SUN CHRONICLE
ATTLEBORO, MA.
D. 18,000

AUG 25 1977

New
England
Newsclip

Army corps says tidal power needed to fuel New England

WALTHAM, Mass. (UPI) — New England eventually is going to need a tidal power facility at Passamaquoddy Bay in Maine, but it cannot be considered a regional alternative to the proposed Dickey-Lincoln hydroelectric project, according to the New England head of the U.S. Army Corps of Engineers.

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He said a tidal project could not be used to meet peaks in "human need" because it is impossible to time the tides to meet the need for peaking power.

PATRIOT LEDGER
QUINCY, MA.
74-938

AUG 25 1977

New
England
Newsclip

Quoddy Not Regional Plan

WALTHAM (UPI) — New England eventually is going to need a tidal power facility at Passamaquoddy Bay in Maine, but it cannot be considered a regional alternative to the proposed Dickey-Lincoln hydroelectric project, ac-

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Normally, the corps does a detailed study of projects after Congress appropriates the money for such an analysis.

MILFORD DAILY NEWS
MILFORD, MA.
D. 14,000

AUG 26 1977

New
England
Newsclip

Passamaquoddy Bay In Maine Eyed For Power

WALTHAM, Mass. (UPI) — New England eventually is going to need a tidal power facility at Passamaquoddy Bay in Maine, but it cannot be considered a regional alternative to the proposed Dickey-Lincoln hydroelectric project, according to the New England head of the U.S. Army Corps of Engineers.

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ONE MID

ME Sunday Telegram
Portland, ME

July 9, 1978

Quoddy Project To Get Another Look

PAGE ONE

By BOB CUMMINGS
Staff Writer

EASTPORT—Quoddy is a dream that won't die, a ghost that never quite goes away.

A pair of public meetings this week in Eastport and in Augusta kick off a new three-year study by the U.S. Army Corps of Engineers on the project that has inspired political rhetoric and dreams of Eastporters for half a century.

The idea of harnessing the Bay of Fundy tides was born in the early 1920s when Dexter Cooper, a young engineer, first drafted Quoddy power plans.

Cooper devoted a lifetime to the project—and died broken and penniless in 1938.

Construction actually began in the early 30s—only to be abandoned amidst controversy and charges of political boondoggles.

Earlier plans died as it became obvious that costs would exceed the value of the electricity that could be produced.

This is still true, the Army says. But it

thinks that with rising prices of oil, coal and nuclear fuel, Quoddy may be feasible over the 100-year life of the dams.

"A tidal project of the Cobscook Bay scale could conceivably become economic in 15 to 30 years," the Army argues.

It's the most somber analysis in the long history of a project that breeds hyperboles.

Generally, Quoddy studies are launched with enthusiastic rhetoric about harnessing "the primordial force of the moon" and the "prodigious tides

of the Bay of Fundy."

"Day after day, year after year, pulled and tugged by the sun and moon as predictably as clockwork, more water surges in and out of the bay here than flows down the Mississippi River in two weeks—almost as much water as pours over Niagara Falls," one Quoddy story enthused.

Whether such enthusiasm is war-

rented will be debated again beginning at 7 p.m. Monday in the Shead Memorial High School Gymnasium in Eastport.

A second meeting is slated for 1:30 p.m. Thursday in the Augusta Civic Center.

At both sessions the Army will explain its new plans, answer questions and receive public comments.

Technically, the new project doesn't involve "Quoddy" at all. Passamaquoddy Bay lies almost entirely in Canada and that country says it doesn't want any part of a joint project.

The new Quoddy is to be entirely within this country. The tidal dams would harness the waters of Cobscook Bay—rather than Passamaquoddy.

In Cooper's early designs, both bays would have been used. Quoddy was to have been the upper basin, Cobscook the lower.

The tides were to be shunted from one bay to another, lengthening the period each day when useful energy could be produced.

The new scheme will be less flexible and would produce smaller amounts of energy.

But Quoddy never was capable of producing much energy by modern standards. Using two bays, engineers figured they could produce about the same energy as the Dickey-Lincoln dams on the St. John River would produce.

The all-American project would produce about half the energy of Dickey-Lincoln and about a tenth of the energy generated last year by the Maine Yankee Atomic Power Co. station at Wiscasset.

A great amount of water flows in and out of Cobscook Bay daily, but it can't be made to fall very far. Eastport has the highest tides in Continental United States. But they average only 18 feet. At times, the tides rise and fall only 11 feet.

The electricity a dam is capable of producing is dependent on the volume of

water and the distance it can be made to drop.

On some tides, Quoddy water drops an average of only five and a half feet—miniscule by hydroelectric standards.

By investing about \$800 million, the Army figures it can produce about 615 million kilowatt hours of electricity a year.

For comparison, Maine Yankee produced 10 times this energy last year. It would take 10 tidal projects like that proposed for Cobscook Bay to equal one such nuclear plant.

And Maine Yankee is small by modern standards. The nuclear plant proposed for Seabrook, N. H. is designed to produce 30 times more electricity than the new Quoddy.

This assumes that it will be economically feasible to squeeze every possible kilowatt out of the Cobscook Bay tides.

The Army has suggested a more likely project would generate about half the maximum energy, making the tidal project about equal to that planned by Great Northern on the Penobscot River.

But the tidal project would cost several times more money than Great Northern says it expects to spend if a Penobscot dam is eventually approved.

Nor will Quoddy energy be a particularly useful form of electricity.

Unlike Dickey, which can be turned on and off to coincide with periods of peak electricity demand, tidal energy is dependent on the flow of the tides.

Maximum production can occur only at low tide. And since low tide comes 50 minutes later each day, the maximum period of electrical generation will similarly shift.

Maximum tidal generation will coincide with peak human demands for electricity only about once every 12 days.

A major part of the new studies, the Army says, will be to figure out how this sporadic production of electricity can be made to fit into the energy production of Maine and New England utilities.

Some of the earlier Quoddy proposals would have used the tidal energy to pump water uphill, where it could be stored to generate electricity when needed, rather than when the tides happen to be right.

But pumped storage adds to the cost of the project—which is already economically unfeasible by conventional energy generation standards.

And all the energy consumed in pumping water up hill, can't be recovered when it flows back down again. About a third is wasted, reducing the amount available to be sold.

Despite these handicaps, the Army thinks Quoddy is worth studying some more. It reasons that as other energy gets more expensive, Quoddy will begin to make economic sense.

"With a fossil-fueled plant, the cost of fuel can be expected to rise sharply. A tidal power investment that looks uneco-

nomie now, will become more valuable, especially if the environmental costs of switching to coal or nuclear waste disposal is considered," an Army promotion brochure argues.

The Army estimates the life of the project at 100 years, though turbines would have to be replaced "every 10 years or so."

Quoddy is often promoted as being environmentally harmless, but the evidence suggests that this isn't entirely true.

Earlier studies said the dam construction would wipe out clams in Cobscook Bay, though some might return "in reduced numbers."

Other fish may also be damaged. The bay forms a "special natural habitat for runs of Atlantic salmon," the Army says.

The great range of tides also produces an unusually diverse collection of animal and plant life in the bay.

Scientists, students and naturalists have used the region for years as an especially rich environmental laboratory.

The new studies must assess whether this diversity would be harmed if the tidal dams are constructed.

Canada is opposed because it fears that harnessing the tides would keep her from migrating to the area, and would hamper free access to the ocean by New Brunswick fishermen.

The effect on the fisheries will be a major part of the new environmental studies which the Army is required to conduct.

The Army must also figure out which of the complex of coves and inlets would be most economical to dam; look at the need for new transmission lines, and decide "whether the tidal project should be recommended to Congress for advanced engineering and preconstruction design."

Bangor Daily News

BANGOR, MAINE, TUESDAY, JULY 11, 1978

Tidal power called brighter but not totally justified

117
EASTPORT, Maine (AP) — The end of abundant, cheap power may have made tidal power feasible, Col. John P. Chandler of the Army Corps of Engineers said Monday.

"This part of the country relies on foreign oil as a fuel to generate more than half our electricity," said Chandler, who is head of the New England Division of the Corps of Engineers.

His comments opened a public hearing held to kick off a new federal study of harnessing the 18-foot tides of Cobscook Bay for electricity.

But he cautioned that a tidal power

project still does not appear to be "fully economically justified," saying federal researchers would try to project the price of oil in considering tidal power.

He said Congress ordered the study because of "uncertainties about the availability and price of petroleum."

About 290 persons, most residents of this depressed Washington County community, turned out for the public hearing at Sheaf Memorial High School.

Chandler said the three-year study will consider the impact a tidal power generating plant would have on the

ecological, social and cultural character of the area.

Most of those at the hearing indicated they favored a tidal power project.

Nathan Cohen, Eastport's development director, said a tidal power plant "...has been kicked around long enough. Hopefully this time it will be constructed."

Cobscook Bay, a labyrinth of inlets and coves between Lubec and Eastport, has the greatest tidal range in the continental United States, and therefore is a prime site to test the feasibility of tidal power generation,

the Corps says.

Tidal power has been studied many times before, but the Corps says the latest study differs from investigations in the 1950s that indicated that tidal power in Maine was not economically feasible.

The Corps now reasons that as other fuels rise in cost, tidal power for peak power production may make more economic sense.

The scope of the latest study is limited to United States territorial waters. Canadian officials have previously opposed harnessing the tides in the nearby bay because they

fear a facility would keep herring from migrating to the area and would hamper free access to the ocean by New Brunswick fishermen.

A power project using tidal pools is similar to a river hydro-electric system, but other factors such as a constantly fluctuating water flow and the problems of salt water corrosion must be taken into effect.

Dams, channels, gates, a powerhouse and fishways would be needed for a tidal project, just as they are necessary in a river project.

Besides looking at economic issues,

the study must figure out which of the coves and inlets in the 39 square miles of Cobscook Bay would be most economical to dam. It will also address the need for transmission lines, the environmental impact on marine life, and social and historical concerns. The study will look at power marketing, the need for such a facility and logical alternatives, the Corps said.

A second public hearing is scheduled Thursday afternoon at the Augusta Civic Center. Information gathered at the hearings is to be used to develop a study plan.

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2 of 2 pages

Evening Express
Portland, ME

JUL 11 1978

Fuel Costs Sparked Tidal Study

EASTPORT (AP) — Federal researchers will have to project the cost of foreign oil in order to determine whether tidal power in Cobscook Bay makes economic sense, the head of the New England division of the Army Corps of Engineers says.

Congress ordered a study of the 18-foot tides in Cobscook Bay because of "uncertainties about the availability and price of petroleum," Col. John Chandler said Monday.

His comments opened the first of two public hearings being held to launch a three-year study of tidal power.

A second hearing will be held Thursday afternoon at the Augusta Civic Center. Information collected at the

hearings will be used by the Corps to develop a study plan.

About 200 persons, mostly residents of Washington County, attended the hearing and most indicated they favor a tidal power project.

Nathan Cohen, Eastport's development director, said a tidal power plant "has been kicked around long enough. Hopefully this time it will be constructed."

Chandler said that the end of abundant, cheap energy may have made harnessing the tides feasible. But he cautioned that a tidal power project does not yet appear to be "fully economically justified."

Cobscook Bay, a complex

of coves and inlets between Lubec and Eastport, has the greatest tidal range in the continental United States and therefore is a prime site to test the feasibility of tidal power, he said.

Tidal power has been studied many times before, but the Corps says the latest study differs from investigations in the 1950's which indicated that tidal power in Maine was not economically feasible.

The scope of the latest study is limited to United States territorial waters. Canadian officials have previously opposed a tidal

power facility in the bay because of fears that a plant would limit access to the bay by New Brunswick fishermen and would keep them from migrating to the area.

Canada has plans to pursue tidal power studies in its own Bay of Fundy.

Besides looking at economic issues, Chandler said the study must figure out which of the coves in Cobscook Bay would be best to dam. It will also address the need for transmission lines and social, environmental, ecological and other concerns.

OCT
Central ME
Morning Sentinel
Waterville, ME

Lewiston Daily Sun
Lewiston, ME

JUL 11 1978

Army Engineer Talks Up Tidal Power For Maine

PAGE ONE

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Cobscook Bay, a labyrinth of

More on TIDAL, Page 10

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Machias Valley News
+ Observer

Machias, ME

July 12, 1978

TIDAL POWER TALKS SET FOR EASTPORT AND AUGUSTA

The Federal Government is again eyeing the 18-foot tides in Cobscook Bay as a possible future source of electrical energy.

The Corps of Engineers will be holding public meetings starting Monday evening, July 10 at 7 p.m. in the high school auditorium in Eastport to discuss plans for an extensive study of tidal energy it is about to launch in response to a Congressional order. A second meeting will be held Thursday afternoon, July 13 at 1:30 p.m. at the Au-

gusta Civic Center.

Colonel John P. Chandler, head of the Corps' New England Division, said that both meetings are intended to provide an opportunity for individual Maine citizens, public agencies and organized groups to obtain information and participate actively in developing the study.

Previous studies, including one conducted by the Corps last year failed to establish that a tidal facility on the Northern Maine coast would be economically feasible.

"We are taking another look," Colonel Chandler said, "because we need to examine every possible means to reduce New Eng-

land's dependence on imported fuel for electrical power. A tidal project could become economically attractive if the price of oil rises faster than inflation and no better alternatives are available."

He noted that water is one of the region's few natural resources capable of producing energy, and that it is self-renewing and non-polluting.

"It's time to see if hydroelectric energy can produce a greater share of New England's power load in the future. But there are environmental questions and alternatives to be considered before any clear judgment can be made," Colonel Chandler observed.

MACHIAS VALLEY NEWS
AND OBSERVER
MACHIAS, ME
W. 2500

JUL 12 1978

News
England
Newspaper

A public meeting is scheduled concerning the Tidal Power Study on July 13, 1978 at 1:30 p.m. at the Civic Center, at Augusta, Me.

The purpose of the public meeting is to solicit ideas and comments. The public is urged to attend.

Additional information and materials may be obtained by contacting: Division Engineer, U.S. Army Corps of Engineers, 428 Trappelo Road, Waltham, Mass. 02154.

quoddy
Ellsworth American
Ellsworth, ME

JUL 13 1961

Reviving Quoddy

US Army Eng.

The hearings the U.S. Army engineers are holding at Eastport and Augusta on the economic feasibility of a new Eastport tidal project are hopeful auguries for the future. The New Deal dropped the Passamaquoddy project in the 1930's on the specious grounds that there was no market for the power. That surely was one of the most misguided arguments that could have been produced. There certainly is an almost unlimited market for Passamaquoddy tidal power, now.

The great French tidal power project on the Rance River is now vindicating the judgment of the builders, and producing power at costs competitive with any other method of power generation. Every year will increase the competitive position of

tidal power and of other forms of water power. The costs of energy produced by oil fired thermal plants are bound to rise rapidly, in the future. Costs of nuclear plants have been skyrocketing.

It needs to be said, at the outset, that Cobscook Bay cannot be dammed up without some environmental costs. They ought to be weighed carefully. Unless they are prohibitive, they should not be permitted to govern the decision. There is no way of producing energy that does not have some environmental cost.

The hearings are a welcome sign of reviving governmental interest in tidal power. The abandonment of the original Quoddy project was a piece of folly that now should be repaired.

Ellsworth American

Ellsworth, ME

July 13, 1978

200 Attend Army Hearing

Tidal Study Renewal Pleases Eastporters

PAGE ONE

By Jeff Beebe

In the nearly 60 years that the Passamaquoddy Bay tidal power project has been "kicked around" by presidents and politicians and dreamers, one thing has never changed — Eastporters and their neighbors on the bay solidly support the project.

No Fundy fog obscured that fact Monday night in Eastport when the U.S. Army Corps of Engineers opened the book again on "Quoddy" with a public informational hearing to launch the development of a "plan of study."

In other words, they're studying what to study.

The project they're aiming at now, however, under orders from the U.S. Congress, is not the well-known international "Quoddy" project that was studied heavily in the 1950's and early 60's. Any tidal power project that might result from these new beginnings will lie entirely within the United States, in the waters of Cobscook Bay inland and around Moose Island, upon which Eastport and Quoddy Village sit.

The Canadian government has made it clear to the Corps of Engineers that it wants no more to do with an international project, although they will have a full-time observer dogging the Army study teams. The Canadians are heavily investigating a tidal power project farther north in the Bay of Fundy, where 40-plus-foot tidal ranges dwarf even the powerful tides of Cobscook Bay.

In the sense that the current idea is entirely American, it resembles

more the project that was actually begun in 1935, only to die after stubborn political maneuvering backlashed on Maine's two U.S. Senators, causing a regional bloc vote that killed further funding for the project.

The Corps' regional director, Col. John Chandler, who ran the meeting, made it clear that, in this renewal of the tidal power study, the corps is not merely warming up some leftover reports and plans, to see how they taste with 70's seasoning.

"The old studies were based on the state of the art at that time," said Chandler. "The Corps is departing from those now. Those are not options—those are not the starting point. They are still unfeasible."

The international joint study reports issued in the mid-60's were unanimous in that the benefit-cost ratio of the tidal power project, in itself, was less than break-even. All of the options considered had to be considered in conjunction with pumped-storage auxiliaries, or river-hydroelectric projects, including the Dickey-Lincoln School dams, to be economically feasible.

The Corps is not really certain that the economics of a tidal power plant are any more profitable today than they were 15 years ago, but a new twist has been added to the formulas they will be using.

"This new study allows consideration of inflation and other economic

concerns," said Jim Callahan, the project engineer for the Corps. The economic calculations will be able to take into account the rising cost of alternative sources of energy over the economic "life" of the project, which is considered 120 years.

So, while tidal power may not break even in its first few years, or in its first ten or twenty years, it may look very economically attractive when New England is suddenly unable to get any more oil. Imported oil now accounts for 63 percent of New England's electricity production, while nuclear power provides 33 percent and water power provides 7 percent.

The meeting Monday night at Shead Memorial High School was used largely by the Corps to outline the step-by-step process to be used in developing a tidal power project.

First, they're developing the plan of study. During this stage they're making note of all the questions that must be asked and answered, all the environmental and geographical surveys that must be made, all the tests that must be performed, all the economic factors that must be weighed, all the options that must be considered, and countless other concerns.

After they develop their plan of study, estimated to take 6-8 months, they'll perform the studies, and enter a stage of developing "intermediate plans." Somewhere during that 18-month stage they'll begin concentrating on a particular

option, and then they'll enter phase three, the development of detailed plans to present to congress for funding.

Col. Chandler said the whole planning process should take from three to four years, if the study is funded by Congress year after year. "But the plan could be interrupted at any time," said Chandler, if the Corps finds at any point that the project is unfeasible on economic, environmental, or engineering grounds.

The three-hour meeting featured two slide presentations by the Corps, a lengthy question and answer period for the approximately 200 persons present, and statements from area residents and officials.

Nobody voiced outright opposition to a tidal power project. However, the president of Boston's Suffolk University and a tidal power project engineer for the Passamaquoddy Indians expressed some concern.

Thomas Fulham of Suffolk University said he was worried about the impact a project might have on his university's Cobscook Bay environmental outpost. But, he said, the laboratory "will be more than willing to assist the Corps in the study of the Bay. We are pleased to offer our ten years of experience in the area."

The Indians' engineer, Normand Laberge, said he spoke on behalf of the Tribal Council, who would prefer a series of many smaller projects, like their Half Moon Cove proposal, instead of one large project. "A series of small projects would be more easily absorbed into the lifestyles of Washington County and Eastport," he argued.

Harry Vose, the president of Eastport's City Council, made it clear where his constituency stands. "The City of Eastport is behind you all the way," he said to loud applause.

"I once thought all this would be a waste of time, but in view of the new formula, I have high hopes that this is one time we have a heck of a shot at having this built," he said.

Dr. Edith Vogl Garrett, spoke of the disappointment she has seen among Eastporters in her 35 years as a resident. "We have fought for this all along and have been told it's just a political football—please don't let it become so again. Please, let us race," she said.

Almost as strong as the support for the tidal power project was a constant undercurrent of opposition to the Pittston oil refinery proposed for the inland shore of Eastport. Col. Chandler admitted that construction of the refinery would "encumber" the tidal project, but he said the Pittston company has assured the engineers that it would take steps to reduce its interference with a tidal power project. He conceded that if the refinery made it to the bay before the power plant, the Corps would have to adopt its plans to make do.

David Colton-Mannheim of Ashville, a member of the Downeast Alliance anti-nuclear group, chastised Chandler and the Corps for their part in producing Pittston's environmental impact statement. He expressed the sentiment of the crowd when he said, "I think the two projects are intimately related. One is good, and one is bad, it's as simple as that."

A Canadian fisherman from Campobello Island had this to say: "I've been a fisherman quite a few years, and I can't see where this power project will hurt anybody, but I'm against the oil refinery. I've seen what oil can do to fish."

"In time, we ain't gonna have no oil, but them tides will flow in and out as long as any of us is here, and it ain't gonna hurt no fishin'...I hope I live to see it built."

A Corps biologist told the crowd that the environmental investigators have an immense task ahead of them in determining what effect the tidal project will have on the fisheries inside and outside the bay, and what might be done to alleviate any potential damage. To most of the questions addressed to him about potential impacts, he could only say, "We just don't know yet—but that's what we're going to study very closely."

In a rough description of what the project might turn out to be, engineer Callahan said the smallest project considered would cost around \$250 million, and the largest \$500 million, and it would probably take about two years to build.

The low end is a 40-megawatt project that would produce 290 million kilowatt-hours per year, and the top end would be a 250-megawatt plant capable of producing 620 million kilowatt-hours per year.

Callahan said the engineers haven't even begun to consider whether they favor a two-pool pro-

ject, capable of producing power longer during the tidal cycle, or a less expensive one-pool project, capable of producing power for a shorter time period. Many other variables exist also, he said, even down to such details as the kind of turbine to be used, and where to place them in the many Cobscook Bay inlets.

As the meeting neared adjournment a woman stood to express her displeasure at a number of press and documentary still photographers who had been taking pictures during the meeting, asking Col. Chandler, if the Corps was resorting to "harassment techniques" she said Pittston used at hearings to discourage opponents.

After a college professor stood to support her, saying it's well known that big-energy companies have their own investigative units, operating much like the CIA, Chandler assured her that such was not the case at this meeting.

Following the meeting, many spectators buttonholed Corpsmen for some time to question them and offer encouragement. And on the way out, many people found still another anti-Pittston poster offered for signature and willingly signed it. It had a list as

OCF - MED - BB

Dickey lobby favors Cobscook project

By The Associated Press. The state's major lobby group for the Dickey-Lincoln hydroelectric project came out for the proposed Cobscook Bay tidal power project Thursday, linking the two together as low-cost energy sources.

"We believe the two projects are related now just as they were more than 40 years ago when first conceived," John R. Goodwin, coordinator of Maine Citizens for Dickey-Lincoln, told a Army Corps of Engineers hearing.

The corps is beginning a detailed study of the feasibility of harnessing the 18-foot tides in Cobscook Bay for power. Although initial construction costs would be very high, Army Col. John P. Chandler said future steep increases in the price of oil might make the project worthwhile.

Chandler, head of the New England division of the corps, said the three-year study

would consider the project's potential impact on the area's ecological, social and cultural character.

Officials check feasibility of harnessing waves

AUGUSTA, Maine (UPI) — Federal officials say they want to find out if it is feasible to generate electricity by harnessing the largest tides along the continental United States.

Col. John P. Chandler, regional head of the U.S. Army Corps of Engineers, Thursday said such a generating project could meet no more than 1 percent of New England's energy needs, but said it would help reduce the region's dependence on foreign oil.

"All of us who live in New England pay a penalty for our dependence on imported fuel. The cost of that fuel will continue to rise as supplies are used up," Chandler said at a public hearing. "If we are to avoid an energy crisis should these supplies be abruptly cutoff we need to examine every resource we have as a potential source of energy."

"One of the ideas we are looking at again is whether the powerful tidal forces in the

Cobscook Bay region of Maine can be economically converted to useful hydroelectric power," he said.

Chandler and other corps officials came to Augusta to explain and receive public input on a plan which is being prepared to guide an in-depth study of the tidal project should Congress decide to fund such an extensive study.

Tidal project

AUGUSTA, Maine (AP) — The state's major lobby group for the Dickey-Lincoln hydroelectric project came out for the proposed Cobscook Bay tidal power project Thursday, linking the two together as low-cost energy sources.

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Chandler, head of the New England division of the corps, said the three-year study would consider the project's potential impact on the area's ecological, social and cultural character.

Dickey-Lincoln, which would turn a long section of the St. John River into a lake, is also a Corps of Engineers project.

Electric Power From the Tide Is Eyed Again

By Maxwell Wiesenthal
Special to The Washington Post

AUGUSTA, Maine—The U.S. Army Corps of Engineers this week kicked off a new three-year study of a Maine dream of the past half century—harnessing the giant tides of Passamaquoddy Bay for a mammoth tidal power project.

The original idea was proposed by Dexter Cooper in the 1920s and a decade later won the support of President Franklin D. Roosevelt.

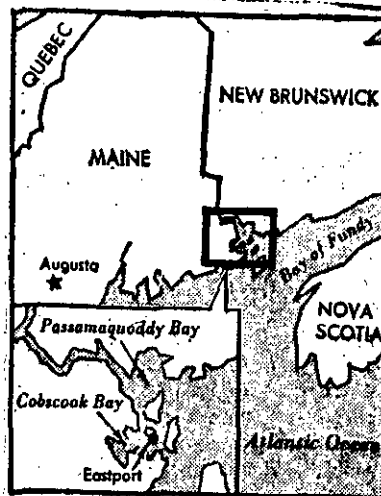
Construction of the tidal power project at Eastport, the most easterly city in the United States, began in the 1930s only to be abandoned when it became obvious that costs would exceed the value then of electricity that could be produced.

The original Passamaquoddy tidal power project was to have been a joint U.S.-Canadian venture. The new project which the Corps of Engineers will study would be smaller in scope and be wholly within the United States. Canadians are about to undertake a similar study of a \$33 million hydroelectric power project in the Bay of Fundy.

Tidal dams would harness the waters of Cobscook Bay which has the greatest tidal range in the continental United States.

Col. John P. Chandler, chief of the New England division of the Corps of Engineers, who presided at the public meeting here Thursday, said that while previous studies failed to establish that a tidal facility on the eastern Maine coast would be economically feasible, "we are now taking another look because we need to examine every possible means to reduce New England's dependence on imported fuel for electrical power.

"A tidal power project could become economically attractive if the price of oil rises faster than it has



The Washington Post

Inset shows site of 1930s project to harness Passamaquoddy Bay that was begun at Eastport and abandoned, and Cobscook Bay, whose tides now are under study by Army Corps of Engineers.

and no better alternatives are available."

He said Congress authorized the study because of the "uncertainties about the availability and price of petroleum."

Acknowledging that the cost of a tidal power project is substantial, Col. Chandler said that after such a facility is completed and operational the annual cost for generating power and for maintenance is far less than any known fuel-dependent alternative.

According to 1976 estimates, the total cost for a project made up of five 12.5 megawatt units plus a 30 megawatt auxiliary generating unit would be \$281.7 million.

other papers say

hopeful auguries

The hearings the U.S. Army engineers are holding at Eastport and Augusta on the economic feasibility of a new Eastport tidal project are hopeful auguries for the future. The New Deal dropped the Passamaquoddy project in the 1930s on the specious grounds that there was no market for the power. That surely was one of the most misguided arguments that could have been produced. There certainly is an almost unlimited market for Passamaquoddy tidal power now.

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The hearings are a welcome sign of reviving governmental interest in tidal power, the abandonment of the original Quoddy project was a piece of folly that now should be repaired.

—The Ellsworth American

Ellsworth American

Ellsworth, Maine

27 July 1978

Army Engineers.

Schedule Tidal

Forum at Lubec

US Army Eng.
The Corps of Engineers has accepted an invitation from officials of the Town of Lubec and neighboring communities to conduct an informational meeting tonight to discuss plans for a major study of tidal power generation in the Cobscook Bay region.

The meeting is scheduled to start at 7 p.m. in the Consolidated School Gymnasium. Public Meetings were held in early July in Eastport and Augusta.

In addition to presenting information and answering questions about the study, the Lubec meeting will be considered as an extension of the previous public meetings, thereby assuring that all formal comments or statements presented will be included in the official record.

It could take three to four years to complete preliminary planning and environmental studies. The overall effort depends on annual Congressional appropriations.

Quoddy tidal model vandalized

In the 1930's the Quoddy Tidal Power project designed by Dexter P. Cooper, looked as though it might be a reality. It was a two pool international concept using both the waters of Cobscook Bay (the present proposal) and Passamaquoddy Bay. Quoddy Village was built to house the people working on the project and a special building in the Village housed a concrete model of the "Passamaquoddy Tidal Power" project.

This model was viewed by many people; school children, visitors and a well known photograph shows President Franklin Roosevelt and Lt. Comdr. Philip B. Fleming of the Army Engineers and other officials viewing the model. The model, made by Noel Potrier, was complete in every detail with working locks, dams and power house. A system of pumps and drains caused the water within the model area to rise and fall as it would if electricity were actually being produced. However, the project died, the construction workers left and the village and houses were all that was left after a few years.

On August 21, 1971 Land Auction Bureau held an auction of the former U.S. Government properties in Quoddy Village.

The night before the auction the building and model were purchased by Ed Knowles of Portland who had worked at Quoddy Village when construction was at its height and had always been interested in the Quoddy Tidal Power project. He had plans to use the model as a tourist attraction either in Eastport or elsewhere. However, he became sick and was in Florida a good deal of the time and over the past eight years the building and model have been vandalized.

The power house and large dam have been taken and Mr. Knowles would appreciate their return. They could be left at the Quoddy Tides office, with no questions asked. Brass valves and fittings have been taken for salvage value. The ceiling lights in the building have been taken and large holes poked in the walls. A large wall map has been removed and both the model and building have deteriorated.

Since he bought the property, Mr. Knowles has paid taxes to the city and had them increased steadily. Now in his mid-sixties and in ill health, Mr. Knowles would like to sell the building and model, preferably to someone who would restore it and keep it in the Quoddy Bay area.

Rep. Emery supports Cobscook Bay Tidal Power Study

Congressman David F. Emery submitted a statement in favor of the Cobscook Bay Tidal Power study at the U.S. Army Corps of Engineers' public meeting at the Augusta Civic Center on July 13th.

Calling tidal power "an ideal source" of energy, Emery pointed out that it is "productive, non-polluting, and renewable."

Emery urged the Corps to consider the long run benefits of tidal power by pointing to France's experience with a similar power project. According to Emery's statement, "France constructed its pilot project in 1966; and although the cost-benefit ratio was initially poor, it is now favorable. The consistency of the project's performance has fascinated scientists."

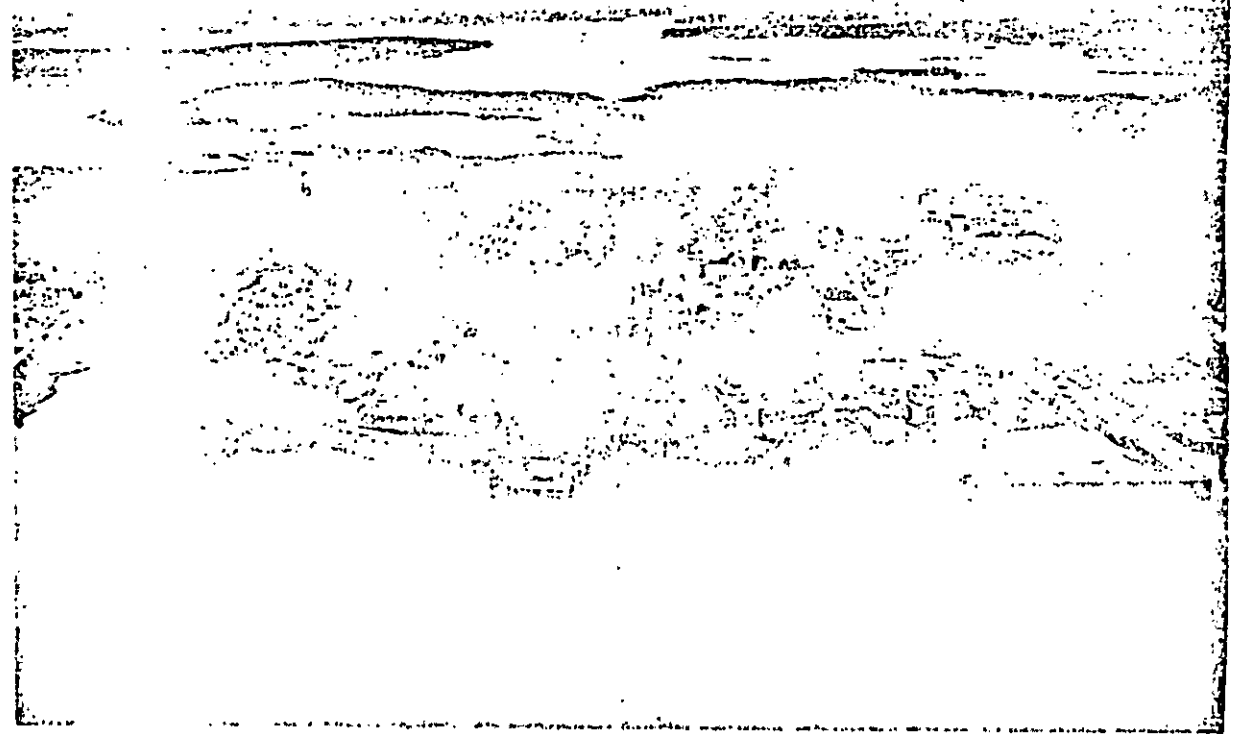
Emery also urged the Corps not to underestimate the benefits derived from the tidal project. In addition to an increase in hydro-electric power and a decrease in dependence on foreign oil, Emery said the benefits would include "a reduction of the disparity in prices which New England states pay for energy and the creation of jobs through investment in an area of traditionally high unemployment."

4 August 1978 (1 of 5)

Maine Times

Top...

THE EASTPORT ALTERNATIVE



Eastport with Cobscook Bay in the background. Despite pressures on them to endorse renewable, alternative energy sources, Maine environmentalists are cautious on tidal power development here. A project in Cobscook could profoundly alter the bay's ecosystem.

Photo by Chris Ayres

Maine Times
Topsham, Maine
4 August 1978 (2 of 5)

No one is waving flags for lunar energy

THE BEARDED fellow who rose from his seat in the Eastport high school gymnasium, where the U.S. Army Corps of Engineers was holding an "informational" meeting on its plans to study the tidal power potential of nearby Cobscook Bay, made it clear that he, for one, was a strong backer of any tidal power proposal, and an equally staunch opponent of the proposed Pittston oil refinery at Eastport.

"These two projects are intimately related,"

he told the Army representatives and the 200 area residents who had turned out for the meeting. "One is good, the other is bad. It's as simple as that."

He might have added that the proposed Seabrook, New Hampshire nuclear power plant (the site of which he had occupied during recent anti-nuclear rallies), the proposed Dickey-Lincoln hydroelectric project on the St. John (which he opposed by, among other things,

adding his name to an anti-dam petition), and perhaps a score of other state and regional power projects in the works, were also "intimately related" to the tidal power project.

For Maine's environmentalists — having taken strong stands against Dickey-Lincoln and further nuclear power development in the region; having either opposed or considered opposing hydroelectric projects on the Kennebec and on the Penobscot's West Branch; having

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expressed reservations about the coal-fired plant proposed for Sears Island; and having opposed from the beginning Pittston's oil refinery plans for Eastport — readily admit feeling politically pressured to endorse viable and more environmentally benign energy alternatives.

Tidal power had been mumbled about for a long while as a likely candidate. The tides were an inexhaustible and non-polluting source of energy. Their harnessing would not foul the air, flood out wild rivers or add to the growing legacy of radioactive waste.

Much had changed since this often-studied energy option last surfaced for consideration, had changed in ways that would make a tidal proposal more appealing this time around.

First and most obviously, there is that energy crisis. It hadn't been a consideration in early analyses. But those predicted shortfalls of petroleum, and the implicit rising curve of fuel prices, had to be figured into the equation this time through. The Army representatives, who conceded that a traditional cost-benefit analysis would flunk this new proposal as it had the earlier ones, said there may well be hope for the tidal option if those skyrocketing fuel prices were taken into account. The capital costs for a tidal power project would still be astronomical, of course, but fifty years from now, when low cost oil-fired plants had run out of fuel, a tidal power project would still be humming away, fully amortized, producing inexpensive energy. If the environmental costs were figured into coal-fired alternatives, and the costs of radioactive waste disposal into nuclear powered alternatives, tidal power might fare well against those options as well, the Army said. Tidal power might begin to

pay for itself within 15 years, the Army spokesmen said.

And tidal power could no longer be written off as some farfetched boondoggle, as it had in the 1940s when Congress cut off further funding for FDR's efforts to harness these same tides. Since 1967, the French had been operating a 2,000 kilowatt tidal power project which harnesses the 47-foot tides of the Rance River at St. Malo, a project the French government says has been economically competitive with conventional power sources. The Russians, in more continuous efforts, have put several small tidal power projects into operation.

Despite the recent developments, despite the dearth of environmentally and economically viable energy alternatives, and despite the fact that Cobscook was the only location in the continental U.S. where large scale tidal power could be viable, there was no vigorous outpouring of support for the Army's effort to revive those plans. There were few at the hearings willing to jump on the tidal power bandwagon, and few waving the flag for "lunar" energy, in the simplistic way that the Pittston opponent had.

The only strong endorsements for the tidal power at the hearings came from Eastport residents, who have embraced each of the numerous tidal power proposals that have passed through during the last 50 years less as an energy alternative than because they represent a potential economic boost to their depressed region. The strongly pro-refinery city council came in favor of the most recent tidal project, its president Harry Vose stating to the engineers, "I have high hopes this is one time we have a back of a shot at having this built." Another Eastport

resident pleaded the project not become a "political football" as it had in the past. "We have fought for this all along," she said. "Please, let us race."

The only energy-related plea for tidal power development at Cobscook came from Rep. David Emery's spokesperson at the hearings. "Never before in our history has the need for alternative sources of energy been so urgent," she said. "The tides seem like an ideal source."

The energy/environmental activists were more cautious. They sat in the wings, silently scribbling notes.

It was too early for any blanket endorsement. "At this stage," said Natural Resources Council of Maine executive director Rob Gardiner, "Cobscook is just an idea."

At this point, the corps of engineers was simply trying to figure out what exactly they were to study with that \$2 million Congressional appropriation. They were hoping the public would give them some suggestions. The engineers had not even begun to consider whether a two pool project, capable of producing power longer during the tidal cycle, or a less costly one pool project, was the more feasible option. They hadn't decided what kind of turbines to use, much less where on Cobscook's many inlets they would be placed. It would be three to four years before the corps would have detailed tidal power plans to present to Congress for further funding. In the meantime, these preliminary studies could be terminated at any time if the corps found the project is economically, environmentally, or technically unfeasible, or if Congress grew tired of the effort and cut funding for the studies.

(Continued on page 12)

At this point, the corps was taking note of the questions that must be addressed; the environmental and geological surveys that must be made, the tests that must be conducted, the economic variables that must be considered.

Not surprisingly, the corps had few answers. And there were many questions.

Many of the hardest questions concerned the environmental implications of a project which would seal off all or portions of the 39 square mile bay, trapping and calming those turbulent 18-foot tides.

Several at the hearing wanted to know what would happen to the bald eagles which feed on fish from the bay. Others wanted to know how the project would affect the area's seal populations.

Others wanted to know how the project would affect shellfish and other marine life in the vicinity.

Some have predicted that the tidal project, by reducing the scouring action of the tides in the impounded area, would make for good aquaculture conditions. Others were dubious. One resident biologist predicted that the calmed tides in the impounded area would warm up substantially in the summer, cool dramatically in the winter, and become less saline as fresh water runoff was trapped behind the dams. It all meant, he said, the likelihood of much more ice than the bay has seen so far. And who knows what all that would do to the ecosystem?

To all the questions about the project's impact on marine life, the corps' biologist had the same answer. "At this point we really don't know," he said. "It's something we plan to study very closely."

But the most interesting question concerned

the profound impact the tidal project would have on the regional tides themselves, and how those changes might in turn affect marine life, erosion, and so on. What would happen to the tides at Head Harbor Passage, for example, if the Canadians decided to tamper with the huge tides in the Bay of Fundy, which they are intensively investigating for power potential, while the Army engineers were altering those tides in Cobscook? Some Canadian experts have predicted that the huge Fundy project alone could alter tides along the entire New England coast, raising the high water mark as much as 12 inches near Logan Airport in Boston.

Some doubted whether such profound and long-term impacts could even be predicted.

"We should proceed with extreme caution," concluded Mary Grow, who has been researching tidal power for the Natural Resources Council. "I would strongly favor smaller scale projects first."

THE CORPS' special affection for grandiose projects was obvious enough. Their slide presentations graphically outlining the small amount of information they had to offer on the Cobscook project were liberally seasoned with picturesque views of their massive hydroelectric achievements elsewhere. One slide offered an artist's rendering of the huge Dickey-Macdonald project the corps is working on for the St. John.

It was also clear that the corps regarded the Cobscook project as small by comparison.

The Canadians had pulled out of an international effort to study the tidal power potential of Passamaquoddy and Cobscook Bays, in favor of investigations of the 40-foot tides at the head of the Bay of Fundy. (The 1000 megawatt Cobs-

cook-Passamaquoddy project would have cost in the neighborhood of \$3 billion.)

So the corps was restricted to a study of the U.S. waters in Cobscook.

The Army will be studying several different tidal power configurations, some of which would utilize virtually all of the 39 square mile basin, others of which would utilize portions of and smaller inlets in the bay. The project might be as small as a \$250 million, 40-megawatt facility, producing 290 million kilowatt hours annually (roughly the size of Great Northern Paper's proposed dam for the Penobscot River), or as large as a 300 megawatt, \$650 million plant capable of producing 620 million kilowatt hours a year.

Normand Laberge, an engineer for the Passamaquoddy Tribe, said he would prefer to see a series of small scale tidal projects which "would be more easily absorbed into the life-styles of Washington County and Eastport."

Laberge and the Passamaquoddies are currently investigating one such tidal power project at Half Moon Cove. They are proposing to build a tidal power project which would have a capacity of from four to 12 megawatts, would generate annually 18 million to 38 million kilowatt hours, and would cost between \$11.4 million and \$26 million. Five percent of the power output would go to the reservation, while the rest would be fed into the regional power grid. One of the main reasons for building the project would be to make possible aquaculture efforts in the 1.3 square mile bay.

The corps, contacted after the hearing, said that a series of small scale tidal power plants on the five or six sub-bays within Cobscook would be one of several tidal power configurations that would be studied.

Laberge has applied for federal funds to implement a feasibility study of the Half Moon Cove project. And he has appealed to state environmental and political leaders for support of the funding request.

The Natural Resources Council recently responded with an endorsement of the plan proposal. The small scale project would provide some needed insights into environmental and economic considerations of tidal power before a large scale project is attempted, the council said. As for the Cobscook project, the council said, "Since so little information on tidal power is available at the present time, studies are imperative before launching into a full scale major tidal project."

Maine Audubon Society has been ever more cautious. Despite the numerous tidal power studies conducted during the past 50 years "no one has done any hard research on how rising tide levels affect marine life," said Cheryl Ring, director of public policy for the organization. "There just seem to be so many environmental problems with tidal power."

For the moment at least, the organization withheld an endorsement of the Indian Point scale project, afraid that that project, too, could have some serious environmental drawbacks.

But in view of the organization's earlier stands against Dickey-Lincoln and nuclear power, and its commitment to seek out and support more environmentally acceptable energy alternatives, the organization's tentative position on tidal power may prove politically untenable.

"It seems tidal power may be the least of all evils," Ring said.

by Peter A. Dinnann

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OFF NAD - RD

Quoddy Tidal Power meeting in Lubec

About 50 Lubec residents attended a public meeting for discussion on the Quoddy Tidal Power project held at the gymnasium July 27.

Three representatives of the Army Corps of Engineers were present with Col. John P. Chandler, Division Engineer for the New England Division of the Corps, presiding at the two-hour meeting. Many questions were asked and discussed in an effort to find out how the majority of the people felt about further study of the project and what the economical impact would be in the area should it be built.

James E. Callahan, Chief of the Hydroelectric Studies Branch and study manager for the Cobscook Bay USA Tidal Power Study, talked about alternative plans prepared by the Corps. These included several types of power generators and combination of pools which would cost between \$281.7 million and \$635 million to build.

Both Callahan and Col. Chandler felt that the Pittston Oil Refinery would pose no problem to the tidal power project in oil spills or carrier traffic.

Dr. Burdette Barrett, an environmental resources specialist and ecologist with the environmental analysis branch, stated that an expensive physical-working model of the power project might have to be built to determine the extent of problems that would possibly be encountered by freezing temperatures in the winter and for other necessary tests.

Complications in the construction of a dam, including strong tidal currents and great depth of water, were pointed out by Col. Chandler.

Local speakers at the meeting were Myron McFadden and the Rev. Donald

Stockford of Lubec and Preston Kinney of Eastport. They were in favor of the Cobscook (Quoddy) Tidal project as they felt that it would bring employment to the area.

It was felt that the small attendance at the meeting was caused by the fact that area residents are growing tired of all the studies and hearings on all projects that have been proposed over the years. As Robert Peacock said—and many other residents agree with him—the Quoddy Tidal Power Project has been bouncing around for 40 years.

Army Engineers Studying Cobscook Bay Tidal Power

Public hearings were held by the Army Corps of Engineers in Eastport and at Augusta this summer as part of a four-year-old study of the feasibility of harnessing the tides of Cobscook Bay to generate electric power.

Such a project would be developed wholly within United States territorial waters, as opposed to the Passamaquoddy Tidal Project, which was to have been a joint venture with Canada. Recently the Canadian government notified the Army Corps of Engineers that it was no longer interested in a cooperative undertaking.

Cobscook Bay separates Eastport and Lubec in Washington County. Its tides range as high as eighteen feet, compared with normal tides of nine to ten feet along the lower Maine coast and thirty feet in Passamaquoddy Bay further east.

In preparation for this summer's public meetings, Dr. Gordon Hauland, dean of the College of Arts and Sciences at the University of Maine at Orono, and Dr. Arthur M. Johnson, chairman of the university's history department, conducted workshops to gather information on the Cobscook Bay power potential.



United States Army
Corps of Engineers
... Serving the Army
... Serving the Nation

NEWS RELEASE

13 August 1979/79-429

COBSCOOK TIDAL POWER PROPOSALS FAIL ECONOMIC TESTS

FOR RELEASE 15 AUGUST 1979

WALTHAM, MASSACHUSETTS -- VARIOUS PROPOSALS TO PRODUCE ELECTRICITY BY HARNESSING THE ATLANTIC OCEAN TIDES IN NORTHERN MAINE'S COBSCOOK BAY ARE NOT JUSTIFIED AT THIS TIME ACCORDING TO A PRELIMINARY ECONOMIC REPORT RELEASED TODAY (WEDNESDAY) BY THE U. S. ARMY CORPS OF ENGINEERS.

COLONEL MAX B. SCHEIDER, THE CORPS' DIVISION ENGINEER IN NEW ENGLAND, WHERE THE STUDIES WERE PERFORMED, SAID "IT IS UNLIKELY UNDER PRESENT ECONOMIC CONDITIONS, AN ENTERPRISE ENTIRELY WITHIN U. S. WATERS COULD PRODUCE ENOUGH REVENUE FROM THE SALE OF ENERGY TO OFFSET THE FEDERAL INVESTMENT REQUIRED TO CONSTRUCT TIDAL POWER FACILITIES AT THIS SITE."

"WE LOOKED AT 13 BASIC PROPOSALS FOR TIDAL POWER GENERATION AND GAVE SPECIAL WEIGHT IN OUR ANALYSIS TO THE RISING COST OF OIL," COLONEL SCHEIDER EXPLAINED. "NEVERTHELESS, WE COULD NOT OVERCOME THE MAJOR DISADVANTAGES INHERENT TO A TIDAL PROJECT; NAMELY, THE HIGH INITIAL COST AND THE INABILITY OF A TIDAL INSTALLATION TO PRODUCE 'DEPENDABLE' GENERATING CAPACITY BECAUSE THE LUNAR CYCLE MAY BE OUT OF PHASE WITH THE DEMAND FOR ELECTRICITY AT ANY GIVEN TIME."

M O R E

NEW ENGLAND DIVISION, PUBLIC AFFAIRS OFFICE
WALTHAM, MA 617-894-2400 EX. 237/238

IN THE 62-PAGE REPORT ON THE ECONOMIC ANALYSIS OF THE PROJECT, THE CORPS CONCLUDES THAT NONE OF THE PLANS STUDIED COULD MEET THE ECONOMIC GUIDELINES REQUIRED BEFORE A PROJECT CAN BE CONSIDERED FOR FEDERAL FINANCING. THE ALTERNATIVES STUDIED RANGED FROM FOUR TO 450 MEGAWATTS OF INSTALLED CAPACITY WITH CONSTRUCTION COSTS ESTIMATED FROM \$21.3 MILLION TO OVER ONE BILLION DOLLARS AT 1979 PRICES.

THE CORPS WILL UNDERTAKE LIMITED ENVIRONMENTAL AND ENGINEERING STUDIES NECESSARY TO COMPLETE ITS RECONNAISSANCE REPORT FOR SUBMISSION TO CONGRESS NEXT YEAR AND THAT MATERIAL, TOGETHER WITH THE TRANSCRIPT OF THE PUBLIC MEETINGS AND OTHER RECORDS, WILL BE AVAILABLE FOR FUTURE REFERENCE BY FEDERAL, STATE AND PRIVATE INTERESTS SHOULD CHANGING CIRCUMSTANCES RENEW INTEREST IN EXPLORING THE NEW ENGLAND TIDES AS A SOURCE OF ELECTRICAL POWER.

COPIES OF THE ECONOMIC STUDY REPORT MAY BE OBTAINED BY CONTACTING THE DIVISION ENGINEER, U. S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION, 424 TRAPELO ROAD, WALTHAM, MA 02154.

Milford Daily News, Milford, MA, Aug 16 1979
Naugatuck Daily News, Naugatuck, CT, Aug 16 1979
Daily News, Newburyport, MA, Aug 16 1979
Sunday Eagle Tribune, Lawrence, MA, Jul 19 1979

OCL-AND

Maine's Coastal Tides Possible Power Source

By ELAINE APOSTOLA

AUGUSTA, Maine (UPI) — As the price of oil increases, harnessing the tides in Maine's Cobscook Bay — the only potential tidal power site in the continental United States — is looking more attractive.

The U.S. Army Corps of Engineers Wednesday said its preliminary economic report showed various proposals to produce electricity by harnessing the Atlantic Ocean tides in the northern Maine bay were not justified yet.

"It is not a good go at this time," Joseph Ignazio, chief of planning for the New England division of the Corps, said. "But it might be at some time in the future."

"It's a good project for Maine, but it's an expensive one," Ignazio said.

Corps economic projections show the most feasible possible project in the bay would only return 90 cents for each one dollar invested.

"Ten years from now, God forbid, it could cost us about \$100 a barrel for oil," Ignazio said, and then the tidal projects would be again considered.

Maine Gov. Joseph E. Brennan said he was "extremely disappointed" the corps had reached an unfavorable conclusion. He ordered the Maine Office of Energy Resources to review the Corps calculations.

A spokesman in the office of Sen. Edmund S. Muskie, D-Maine, said the powerful chairman of the Senate Budget Committee had asked the corps to continue studying the possibility of harnessing the tides of Cobscook Bay.

He said Muskie wants to compare the economics of the tidal project with those of

President Carter's synthetic fuel program, and to reevaluate Cobscook Bay's potential if it were operated along with the proposed DickeyLincoln hydroelectric project under study in northwestern Maine.

State Rep. Sherry F. Huber, R-Falmouth, a supporter of the projects, said she was not disappointed: "It may be set back for a period of time but as the price of oil goes up I'm sure it will look more attractive."

"In a matter of time it will look as viable as any other project," she said.

Col. Max B. Scheider, the Corps' division engineer in the region, said "It is unlikely under present economic conditions, an enterprise entirely within U.S. waters could produce enough revenue from the sale of energy to offset the federal investment required to construct tidal power facilities at this site."

"We looked at 13 proposals for tidal power generation and gave special weight in our analysis to the rising cost of oil," Scheider said.

"Nevertheless, we could not overcome the major disadvantages inherent to a tidal project; namely the high initial cost and the inability of a tidal installation to produce dependable generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time."

In the 82-page report on the economic analysis of the project, the Corps concluded none of the plans studied could meet the economic guidelines required before a project can be considered for federal funding.

The alternatives studied ranged up to 450 megawatts of installed capacity with construction costs estimated from \$21.3 million to more than \$1 billion at 1979 prices.

Tides Look Good to Produce Electricity

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The Fading Quoddy Dream

The old dream of harnessing the tides of the northern Maine coast is fading away in the face of reality.

The U.S. Army Corps of Engineers, no shrinking violet when it comes to construction projects, has concluded that tidal power generation in Cobscook Bay, southwest of Passamaquoddy, just wouldn't pay off. "We can't come up with a feasible benefit-to-cost ratio," said Walter Mackie, a corps spokesman, the other day.

If the Army engineers can't find a feasible reason to build the thing, sure as shooting nobody else can.

Building dams and conduits below high tide level poses large engineering problems and staggering costs. Another problem is that the tides are not constant. They vary from 13 to 27 feet in Cobscook Bay, depending on the moon.

The corps report is a blow to Maine Sen. Edmund Muskie and Gov. Joseph Brennan, both of whom

had been banking on a big federal project to pull the Eastport region out of its chronic economic doldrums.

The energy picture for northern Maine isn't bright. The tidal proposal has been, in effect, shot down. The Dickey-Lincoln Dam has finally generated enough opposition to stop it in its tracks. The coal-fired power plant proposal at Sears Island is running into opposition. A campaign is afoot to close down the state's only nuclear power plant at Wiscasset. And the Pittston Co.'s proposed oil refinery at Eastport has run into opposition from environmentalists on various grounds, including its possible effect on the bald eagle.

Fortunately, Maine does have a lot of wood to burn. The latest estimate is that more than half of all Mainers will rely on wood stoves in whole or in part this winter.

Thank heaven for small favors.

For Cobscook Bay

Tidal power 'not justified'

PAGE ONE

Bangor Daily News, Bangor, ME
Central Maine Morning Sentinel
Waterville, ME, Aug 16 19

PORTLAND, Maine (AP) — The old dream of harnessing the ocean tides in eastern Maine to produce electricity was dealt another blow Wednesday by a U.S. Army Corps of Engineers' report which declared such proposals "not justified" economically.

In a preliminary economic report to Congress, the Corps said it looked at 13 proposals for tidal power generation in Cobscook Bay, which has tides ranging from 13 to 27 feet, "and gave special weight in our analysis to the rising cost of oil."

But Col. Max B. Schelder, the Corps' division engineer in New England, said, "We could not overcome the major disadvantages inherent to a tidal project; namely, the high initial cost and the inability of a tidal installation to produce 'dependable' generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time."

The Corps said the alternatives ranged from four to 450 megawatts of installed capacity, with construction costs estimated from \$21.3 million to more than \$1 billion at 1979 prices.

"We can't come up with a feasible benefit-to-cost ratio," Corps spokesman Walter Mackie said in a telephone interview from Waltham, Mass. "We couldn't get the money spent (on the project) back by sale of the power."

Asked whether the Cobscook Bay concept is now dead, Mackie said it "would be up to the president and Congress to say that."

Sen. Edmund S. Muskie's office said the Maine Democrat, a longtime supporter of the idea, was "extremely disappointed" by the report. But in view of the need for alternate energy sources, "he's going to work to try to keep the project alive," a spokeswoman said.

Gov. Joseph E. Brennan also expressed disappointment, but questioned the results of the study, noting that 1977 studies "indicated that the project was nearly economically feasible at that time." The governor ordered his Office of Energy Resources to review the latest analysis and report to him by the end of the month.

In Eastport, the economically depressed town on the eastern end of the bay, City Manager Everett Baxter said he was "very frustrated" but not really surprised by the report.

"That's what they (the Corps) said 35 years ago, and if they had some foresight...we might have had good, cheap power today," Baxter said. "As long as they continue with these types of (reports), the economics of the thing will never catch up with them."

Baxter, who also supports the Pittston Co.'s proposed oil refinery in Eastport because of the boost it would give to the local economy, said federal engineers and officials "don't have to scratch out a living here."

"There's an old saying here: 'Them's who got gets, and if you don't got it, you don't get it,'" Baxter said.

The Passamaquoddy Indian tribe, meanwhile, is going ahead with its own \$160,000 feasibility study of a small pilot project on Half-Moon Cove in Cobscook Bay, one which would generate electricity for between 10,000 and 15,000 people, mostly in Washington County.

The project's director, engineer Norman Laberge, said the study would begin in September and take eight months to complete. "We feel the results are going to justify construction of a small demonstration project," Laberge said by phone from the Passamaquoddy reservation at Pleasant Point.

Laberge said that "over the long term is where tidal power will progressively improve in relation to conventional power sources." He said the Half-Moon Cove project, which could be one of "a series of small projects integrated into the same network," could be on line by 1985 if it appears feasible.

He estimated the cost of a 10-megawatt project at \$25 million.

The idea of a tidal power project in Cobscook Bay or the adjacent Passamaquoddy Bay was first advanced in 1912. A small part of it was actually built in the mid-1930s under President Franklin Roosevelt's administration but work was halted when Congress refused to appropriate the money.

Canadian officials have opposed harnessing the tides in Passamaquoddy Bay because they fear a facility would keep herring from migrating to the area and would hamper free access to the ocean by New Brunswick fishermen. The Corps then turned its attention to a solely American project in Cobscook Bay, a labyrinth of inlets and coves between Eastport and Lubec.

The Corps said it will begin limited environmental and engineering studies necessary to complete its report for submission to Congress next year.

Tidal Power Not Justified, Says Corps

AUGUSTA, Maine (UPI) — As the price of oil increases, harnessing the tides in Maine's Cobscook Bay — the only potential tidal power site in the continental United States — is looking more attractive.

The U.S. Army Corps of Engineers Wednesday said its preliminary economic report showed various proposals to produce electricity by harnessing the Atlantic Ocean tides in the northern Maine bay were not justified yet.

"It is not a good go at this time," Joseph Ignazio, chief of planning for the New England division of the Corps, said. "But it might be at some time in the future."

"It's a good project for Maine, but it's an expensive one," Ignazio said.

Corps economic projections show the most feasible possible project in the bay would only return 90 cents for each one dollar invested.

"Ten years from now, God forbid, it could cost us about \$100 a barrel for oil," Ignazio said, and then the tidal projects would be again considered.

Maine Gov. Joseph E. Brennan said he was "extremely disappointed" the corps had reached an unfavorable conclusion. He ordered the Maine Office of Energy Resources to review the Corps calculations.

A spokesman in the office of Sen. Edmund S. Muskie, D-Maine, said the powerful chairman of the Senate Budget Committee had asked the corps to continue studying the possibility of

harnessing the tides of Cobscook Bay.

He said Muskie wants to compare the economics of the tidal project with those of President Carter's synthetic fuel program, and to re-evaluate Cobscook Bay's potential if it were operated along with the proposed Dickey-Lincoln hydroelectric project under study in northwestern Maine.

State Rep. Sherry F. Huber, R-Falmouth, a supporter of the projects, said she was not disappointed. "It may be set back for a period of time but as the price of oil goes up I'm sure it will look more attractive."

"In a matter of time it will look as viable as any other project," she said.

Col. Max B. Schelder, the

Corps' division engineer in the region, said "it is unlikely under present economic conditions, an enterprise entirely within U.S. waters could produce enough revenue from the sale of energy to offset the federal investment required to construct tidal power facilities at this site."

In the 62-page report on the economic analysis of the project, the Corps concluded none of the plans studied could meet the economic guidelines required before a project can be considered for federal funding.

The alternatives studied ranged up to 450 megawatts of installed capacity with construction costs estimated from \$21.3 million to more than \$1 billion at 1979 prices.

Tidal project too expensive — US report

By Molly Bolton
States News Service

BOSTON GLOBE
8/16/79

WASHINGTON — Despite soaring oil prices, proposals to harness the Atlantic Ocean tides in northern Maine's Cobscook Bay cannot yet be justified economically as a means of producing electricity, the US Army Corps of Engineers said yesterday.

A preliminary economic report released by the Corps' New England division concludes that none of the more than one dozen construction plans considered for the tidal project could meet required economic guidelines for federal financing.

The proposal, commonly known as the Passamaquoddy Tidal Bay Project, had been considered the best candidate for tidal development in the United States, with the exception of several sites in Alaska.

"We could not overcome the major disadvantages inherent to installation to produce dependable generating capacity because the lunar cycle may be out of phase with the demand for electricity at any time," said Army Corps Col. Max B. Scheider.

The alternatives studied included a variety of dams, locks and ocean-driven turbines with an energy production capacity ranging from five to 450 megawatts. Their costs ranged from \$21.3 million to over \$1 billion at 1979 prices.

In making its economic analysis, the Army Corps employed three scenarios, which projected annual oil price increases at 1 percent, 3 percent and 5 percent between 1978 and 1994.

The tidal project, which would be used as an alternative to oil, would cost more over its lifetime than the value of the energy produced if oil prices increased at 1 and 3 percent annually, the report said. Only if oil prices increased at 5 percent annually would the project break even.

"If the cost of oil goes over \$35 (a barrel) then you could build the project," said Joseph Ignazio, chief of the corps' planning division in New England.

The Corps' projections, however, might well prove conservative. This year alone oil prices jumped at least 50 percent, from about \$14 a barrel to about \$24.

The Corps' report caused considerable dismay among members of the Maine congressional delegation, which has enthusiastically supported further study of the project.

"The senator is very disappointed," said a spokesman for Sen. Edmund S. Muskie (D-Maine). "He doesn't think any alternative energy source should be overlooked at this point, and he will work to keep it alive."

Ignazio noted, however, that the corps was not trying to shut the door on the project. "The purpose of this really is to get comment... This is an opportunity to keep it alive."

Until 1977 it was thought that the Canadian government would participate in the project, which in its most ambitious form would span Passamaquoddy Bay, which includes Canadian waters. The Canadians, however, pulled back their interest, apparently to concentrate on the development of tidal power in the Bay of Fundy.

Dream of harnessing tidal power in Maine dealt blow by report

PORTLAND, Maine (AP) — The old dream of harnessing the ocean tides in eastern Maine to produce electricity was dealt another blow yesterday by an Army Corps of Engineers report that declared such proposals "not justified" economically.

In a preliminary economic report to Congress, the Corps said it had looked at 13 proposals for tidal-power generation in Cobscook Bay, which has tides ranging from 13 to 27 feet, "and gave special weight in our analysis to the rising cost of oil."

But Col. Max B. Schelder, the Corps' division engineer in New England, said "we could not overcome the major disadvantages inherent to a tidal project: Namely, the high initial cost and the inability of a tidal installation to produce 'dependable' generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time."

THE CORPS said the alternatives ranged from four to 450 megawatts of installed capacity, with construction costs estimated from \$21.3 million to more than \$1 billion at 1979 prices.

"We can't come up with a feasible benefit-to-cost ratio," Corps spokesman Walter Mackle said in a telephone inter-

view from Waltham, Mass. "We couldn't get the money spent (on the project) back by sale of the power."

Asked whether the Cobscook Bay concept is now dead, Mackle said it "would be up to the President and Congress to say that."

Sen. Edmund S. Muskie's office said the Maine Democrat, a longtime supporter of the idea, was "extremely disappointed" by the report. But in view of the need for alternate energy sources, "he's going to work to try to keep the project alive," a spokeswoman said.

Gov. Joseph E. Brennan also expressed disappointment, but questioned the results of the study, noting that 1977 studies "indicated that the project was nearly economically feasible at that time." The governor ordered his Office of Energy Resources to review the latest analysis and report to him by the end of the month.

IN EASTPORT, the economically depressed city on the eastern end of the bay, City Manager Everett Baxter said he was "very frustrated" but not really surprised by the report.

"That's what they (the Corps) said 35 years ago, and if they had some foresight... we might have had good, cheap power today," Baxter said. "As long as

they continue with these types of (reports), the economics of the thing will never catch up with them."

Baxter, who also supports Pittston Co.'s proposed oil refinery in Eastport because of the boost that it would purportedly give the local economy, said federal engineers and officials "don't have to scratch out a living here."

"There's an old saying here: 'Them's who get gets, and if you don't get it, you don't get it,'" Baxter said.

THE PASSAMAQUODDY INDIAN tribe, meanwhile, is going ahead with its own \$160,000 feasibility study of a small pilot project on Half-Moon Cove in Cobscook Bay, one which would generate electricity for between 10,000 and 15,000 people, mostly in Washington County.

The project's director, engineer Norman Laberge, said the study would begin in September and take eight months to complete. "We feel the results are going to justify construction of a small demonstration project," Laberge said by phone from the Passamaquoddy reservation at Pleasant Point.

Laberge said that "over the long term, is where tidal power will progressively improve in relation to conventional power sources." He said the Half-Moon Cove project, which could be one of a series of

small projects integrated into the same network, "could be on line by 1985 if it appears feasible."

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The idea of a tidal-power project in Cobscook Bay or the adjacent Passamaquoddy Bay was first advanced in 1912. A small part of it was actually built in the mid-1930s under President Franklin Roosevelt's administration but work was halted when Congress refused to appropriate the money.

Canadian officials have opposed harnessing the tides in Passamaquoddy Bay because they fear that a facility would keep herring from migrating to the area and would hamper free access to the ocean by New Brunswick fishermen. The Corps then turned its attention to a solely American project in Cobscook Bay, a labyrinth of inlets and coves between Eastport and Lubec.

Tidal study is disappointing

By JON HALVORSEN

AP Writer

Gov. Joseph E. Brennan and Sen. Edmund S. Muskie say they're disappointed by a federal study which dealt another blow to the old idea of harnessing the ocean tides in eastern Maine to produce electricity.

But neither the governor nor the senator is willing to give up on the project.

In a preliminary economic report to Congress, the U.S. Army Corps of Engineers said Wednesday it had looked at 13 proposals for tidal power generation in Cobscook Bay, which has tides ranging from 13 to 27 feet, "and gave special weight in our analysis to the rising cost of oil."

But Col. Max B. Scheider, the Corps' division engineer in New England, said "we could not overcome the major disadvantages inherent to a tidal project; namely, the high initial cost and the inability of a tidal installation to produce 'dependable' generating capacity because the lunar cycle may be out of phase with the

demand for electricity at any given time."

The Corps said the alternatives ranged from four to 450 megawatts of installed capacity, with construction costs estimated from \$21.3 million to more than \$1 billion at 1979 prices.

"We can't come up with a feasible benefit-to-cost ratio," Corps spokesman Walter Mackie said in a telephone interview from Waltham, Mass. "We couldn't get the money spent (on the project) back by sale of the power."

Muskie's office said the Maine Democrat, a longtime supporter of the idea, was "extremely disappointed" by the report. But in view of the need for alternate energy sources, "he's going to work to try to keep the project alive," a spokeswoman said.

Gov. Brennan also expressed disappointment, but questioned the results of the study, noting that 1977 studies "indicated that the project was nearly economically feasible at that time." The governor ordered his Office of Energy Resources

to review the latest analysis and report to him by the end of the month.

In Eastport, the economically depressed town on the eastern end of the bay, City Manager Everett Baxter said he was "very frustrated" but not really surprised by the report.

"That's what they (the Corps) said 35 years ago, and if they had some foresight...we might have had good, cheap power today," Baxter said. "As long as they continue with these types of (reports), the economics of the thing will never catch up with them."

Baxter, who also supports the Pittston Co.'s proposed oil refinery in Eastport because of the boost it would give to the local economy, said federal engineers and officials "don't have to scratch out a living here."

Meanwhile, the Passamaquoddy Indian tribe is going ahead with its own \$160,000 feasibility study of a small demonstration project at Half Moon Cove on Cobscook Bay.

Sorry About That, Eastport

If one is to accept the latest Corps of Engineers report on Down East tidal power, we are right back where we were over 40 years ago, clutching an impractical dream.

Despite the mounting cost of other methods of power generation, Quoddy still isn't cost justified, say the engineers. Sorry, but it still wouldn't pay to harness the tides there to generate electricity, they explain.

Canadian herring fishermen will be pleased, but not much of anyone else.

Gov. Joseph Brennan was disappointed, as well he might be. He'd just gotten through recommending that the Sears Island coal plant be deferred another year.

Environmentalists and the Republican Congressional delegation certainly couldn't have welcomed it. They've been busy recently digging a grave for the proposed Dickey-Lincoln hydro power project.

Anti-nukers must have been at least a little sorry. A viable tidal power project has been a handy thing to have around as an alternative to atomic energy.

One group that probably wasn't disappointed by the report was that composed of the people who eschew the trappings of modern civilization and prefer the tallow candle and the old fashioned ice box to electric devices anyway.

Other than the wind and the sun, they reject harnessing any source of power generation since all of them inevitably have some negative effect on the environment.

Nevertheless, Sen. Edmund S. Muskie has resolved to do all he can to keep Quoddy alive, despite the latest unfavorable turn. The way things are going, it may one day prove to be one of the few acceptable methods of electric power generation. If we can bring those Canadian herring fishermen around, that is.

OLE REED BD

Tidal Power Nixed

The more than half a century old dream of harnessing the high tides off Eastport, has suffered another devastating blow. The Army Corps of Engineers, after the latest study, has reported to Congress that the project is "not justified" economically.

The Corps "gave special weight" to the rising cost of oil but reported: "We could not overcome the major disadvantages inherent to a tidal project, namely, the high initial cost and the inability of a tidal installation to produce 'dependable' generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time." The report concluded that a feasible benefit-to-cost ratio could not be arrived at and "we couldn't get the money spent (on the project) back by sale of the power."

The special report referred primarily to Cobscook Bay, adjacent to Passamaquoddy Bay. A start was made in the 1930s at the latter bay, but the work was halted when Congress discontinued funds.

Both Sen. Edmund S. Muskie and Gov. Joseph E. Brennan expressed disappointment with the new report. Muskie plans to work to keep the project alive; while Brennan has ordered the state Office of Energy Resources to review the latest analysis and report to him by the end of the month.

In view of present conditions and the urgent need for alternate sources of energy, especially renewable energy, the Army Corps of Engineers report is a surprise as well as a disappointment.

Meanwhile, the Passamaquoddy Tribe of Indians, whose main reservation is near Eastport, is going ahead with a \$160,000 feasibility study of a small tidal project on Half-Moon Cove in Cobscook Bay, to generate electricity for 10,000 to 15,000 people. The study is to begin next month and will take eight months to complete. If it proves feasible, the tribe intends to undertake a series of small tidal projects and integrate them into a network. A 10 megawatt project has been estimated to cost \$25 million.

It will be ironic indeed if the Passamaquoddies harness the tides which neither the state nor the federal government has been able to do!

Cohen says U.S. engineers are biased on tidal power

By Arthur B. Layton Jr.
Of the NEWS Staff

Sen. William S. Cohen, R-Maine, said Friday he thinks the U.S. Army Corps of Engineers probably has a predisposition toward the Dickey-Lincoln hydro electric project and an anti-tidal power bias; that Mainers should be prepared for fuel emergencies this winter; and, that he is cautious about the SALT II agreement.

About the recently announced revised Indian land claims settlement the senator said, "I'm not prepared to reject it outright. I'll study it. I was quite surprised that new terms were suddenly being negotiated."

Cohen made his remarks at a press conference at Bangor International Airport Friday afternoon after arriving in his native city for the weekend.

The state's junior senator and member of the Senate Armed Services Committee arrived in Bangor via Washington following an eight-day tour of Israel which he described Friday as "primarily a pleasure trip with friends from the Greater Portland Area."

Cohen said news of United Nations Ambassador Andrew Young's meeting with a representative of the Palestine Liberation Organization broke in Israel the day he left.

"There's a definite apprehension that the United States has altered its traditional alliance and support of Israel," he said.

"They (the Israelis) fear undue pressure will be brought for concessions that could jeopardize their survival," the senator continued.

Cohen said he would be reluctant to see a U.S. military presence in the Middle East to assure this country access to that area's oil supply and said Congress will have time to pass legislation concerning fuel oil supplies this winter.

About President Carter's recent promise that New England will have enough home heating oil this winter Sen. Cohen said, "I don't think we can rely on anyone's guarantees at this point. We must anticipate emergencies."

Waxing mildly humorous, he said that because of the

coming presidential primaries in New Hampshire that that state probably has a safer edge on having enough oil this winter than Maine.

"Based on what I know now I think there will be enough oil this winter, but I don't think anyone can plan what's going to take place. I have reason for optimism but we have to provide assistance for the poor during the cold months. Congress is going to have to respond."

About moves to keep Loring Air Force Base at Limestone open Sen. Cohen said, "I'm still optimistic."

The senator said he was concerned about what he described as the ambiguous language in parts of the SALT II agreement and said he feared the consequences acceptance of such language might have on future SALT negotiations.

About Dickey-Lincoln and the Corps of Engineers recent report, he said the wording of that statement was also ambiguous and added:

"Obviously there is a predisposition towards Dickey-Lincoln, but I wouldn't be prepared to offer that as an allegation."

Harness tides for power

AUGUSTA, Maine (UPI) — As the price of oil increases, harnessing the tides in Maine's Cobscook Bay — the only potential tidal power site in the continental United States — is looking more attractive.

The U.S. Army Corps of Engineers Wednesday said its preliminary economic report showed various proposals to produce electricity by harnessing the Atlantic Ocean tides in the northern Maine bay were not justified yet.

"It is not a good go at this time," Joseph Ignazio, chief of planning for the New England division of the Corps, said. "But it might be at some time in the future."

"It's a good project for Maine, but it's an expensive one," Ignazio said.

Corps economic projections show the most feasible possible project in the bay would only return 90 cents for each one dollar invested.

"Ten years from now, God forbid, it could cost us about \$100 a barrel for oil," Ignazio said, and then the tidal projects would be again considered.

Maine Gov. Joseph E. Brennan said he was "extremely disappointed" the corps had reached an unfavorable conclusion. He ordered the Maine Office of Energy Resources to review the Corps calculations.

A spokesman in the office of Sen. Edmund S. Muskie, D-Maine, said the powerful chairman of the Senate Budget Committee had asked the corps to continue studying the possibility of harnessing the tides of Cobscook Bay.

He said Muskie wants to compare the economics of the tidal project with those of President Carter's synthetic fuel program, and to reevaluate Cobscook Bay's potential if it were operated along with the proposed Dickey-Lincoln hydroelectric project under study in northwestern Maine.

State Rep. Sherry F. Huber, R-Falmouth, a supporter of the projects, said she was not disappointed. "It may be set back for a period of time but as the price of oil goes up I'm sure it will look more attractive.

"In a matter of time it will look as viable as any other project," she said.

Col. Max B. Schelder, the Corps' division engineer in the region, said "It is unlikely under present economic conditions, an enterprise entirely within U.S. waters could produce enough revenue from the sale of energy to offset the federal investment required to construct tidal power facilities at this site.

"We looked at 13 proposals for tidal power generation and gave special weight in our analysis to the rising cost of oil," Schelder said.

"Nevertheless, we could not overcome the major disadvantages inherent to a tidal project; namely the high initial cost and the inability of a tidal installation to produce dependable generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time."

In the 62-page report on the economic analysis of the project, the Corps concluded none of the plans studied could meet the economic guidelines required before a project can be considered for federal funding.

Passamaquoddy

The report of the U.S. Army Engineers declaring the Passamaquoddy power project not economically feasible comes as a shock and a disappointment to Maine. Previous feasibility studies (when oil was a lot cheaper and power a lot more abundant) found the project economically feasible. The Sills Commission, and the Public Works Administration, both found the cost-benefit ratio favorable in the 30's. Construction was commenced and then abandoned under various political pressures. The Administration of John F. Kennedy made a new evaluation in 1963, and it found the project "economically feasible."

The Army Engineers now say they have studied proposals involving from four to 450 megawatts and have found all of them not feasible at costs of \$21 million to more than \$1 billion. The original Quoddy project was estimated by Dexter Cooper to cost \$30 million. The Army Engineers later estimated it to cost \$100 million. They disregarded Cooper's original plans and spent \$7 million dollars on preliminary rock-filled dams, to the horror of congressional opponents, who then defeated further appropriations. George Marvin, who wrote a history of Passamaquoddy for THE ELLSWORTH AMERICAN in 1974 concluded:

"The War Department engineers did a superb job of sabotaging the project, whether intentionally or not, and had it not been for this, Quoddy today might be a reality."

History seems to repeat itself, monotonously, like an idiot. It is hard to figure out how the project that was cost effective in the 30's cannot be cost effective now in the 70's with oil and other energy sources worth more than ten times as much.

The nation needs to exploit renewable energy resources. Substitutes for fossil fuels must be found and found quickly. The short-run alternative to oil probably is coal. In the long run, there is every prospect that hydro-electric power and solar power can play a large role. The narrow standard of contemporary costs are not an appropriate measure of the need for or usefulness of Passamaquoddy power in the future.

If tidal power and other hydro-electric power projects are not started in the seventies, society is going to condemn the politicians and economists who failed to foresee our coming crisis. Passamaquoddy has the limitations of tidal power fluctuations; but France and the Soviet Union both are exploiting tidal power. This country ought to be doing the same thing.

Luke warm

To the Editor: U.S. *Orin Corporation*

Both Maine Senator Edmund Muskie, and Maine Governor Brennan, always luke warm to the Passamaquoddy Dam development, now that its chances of being built are practically nil, under President Carter's regime, now speak up verbally through the Press and Television, knowing that under the present set up it won't be built, and are very vociferous in their proposed support for the Quoddy Dam.

This is all political, before an election year, as both Senator Muskie and Governor Joseph Brennan have been and still are for the "Dickey Lincoln" dam project, and their statements are put forth to try and pacify the hundreds of thousands of Maine people that want the "Quoddy" Development.

Some of us have been around too long to take Muskie's and Brennan's recent statements at full value.

"Dickey Lincoln" would be controlled by the big Power Companies, the Quoddy development NO.

It would be nice sometime to have a Governor of the State who didn't play ball with the big paper and power companies, and woodland owners, and have a U.S. Senator that really represented Maine in Washington.

U.S. Senator William Cohen of Bangor has the makings, but he straddles the fence so much, its hard to understand just where he stands.

Maybe in the near future, we can elect U.S. Senators and U.S. Representatives that truly represent the State of Maine electorate along with a Governor who doesn't hold secret meetings behind closed doors like that he held recently with the St. Regis Paper Company.

FRED A. HERRON
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Kittery, Me. 03904

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Muskie asks corps to reconsider Quoddy

By John S. Day

NEWS Washington Bureau

WASHINGTON — Sen. Edmund S. Muskie has asked the Army Corps of Engineers to reconsider its unfavorable analysis of Maine's Passamaquoddy Bay tidal project.

Aides to the senator said that Quoddy is more economically feasible than most of the synthetic fuel projects proposed as part of President Carter's \$100 billion energy-independence program, especially if the tidal generation plant is linked to the controversial Dickey-Lincoln dams in Aroostook County.

The aides indicate that Muskie may push for a new study into the feasibility of a combined Dickey-Lincoln-Passamaquoddy Bay project when Congress returns from its month-long recess in September.

Joseph Ignasio, chief of planning for the corps' New England Division, agreed with Muskie's assessment that Quoddy's chances are much better if it is linked to Dickey-Lincoln. Such a proposal was advanced by the Kennedy administration during the 1960s, but was never approved by Congress.

A spokesman for the Natural Resources Council of Maine, a major environmental opponent of Dickey-Lincoln, indicated that the council would almost certainly oppose a combined hydro system even though it has looked with favor on the possibility of a tidal project in the past.

The Army Corps of Engineers dashed hopes for Quoddy on Aug. 13 when it issued a 64-page report which concluded that the Maine tidal project was economically unfeasible. Ignasio stressed that the release of the report was not intended to kill Quoddy, but to "stir up public comment" regarding the project.

Since the corps took the position in its report that Quoddy would return only 90 cents for every dollar spent by the federal government to build it, aides to Muskie and other members of the Maine congressional delegation have explored ways to keep the project alive.

Jim Case, a member of Muskie's staff, said that the Maine senator has asked the corps to reconsider its conclusions, declaring that the corps' report was based on unrealistic assumptions.

The study, according to Case, was based upon an assumption that oil costs would remain at their present level of about \$24 per barrel.

The same assumption applied to Dickey-Lincoln resulted in a favorable \$1.40 benefit for each \$1 spent by the federal government.

"Their rationale did not allow for future energy cost increases. Congress is about to invest billions for synthetic fuel development in projects which have miserable cost-benefit ratios. I think we should take another close look at Quoddy before we start to throw billions away on these projects," said Case.

Ignasio conceded that Quoddy, standing alone, would probably have a favorable cost-benefit ratio when the price of oil hits \$35 per barrel. Such a development could happen as early as next year.

Linked to Dickey-Lincoln, the joint project would generate approximately 1,500 megawatts of electricity, which is about equal to the Seabrook, N.H., reactor under construction. The cost of the combined Maine hydro project could be as little as half of Seabrook's possible \$3 billion price tag, the corps officials indicated.

Ignasio said that the corps would look with favor on a congressional directive to explore the joint project plan. He said that Quoddy could supply the energy to pump water back into storage behind the Dickey-Lincoln dams to meet upwards of 15 percent of New England's peak-hour requirements.

Base-load power from Quoddy itself, he said, would supply the continuous needs of northern and eastern Maine, possibly as far south as Bangor. Because of Quoddy's dependence upon tidal cycles, it would not be effective as a peak-power generating station.

Case said that Muskie, through his seat on the Senate Public Works Committee, could request funds for a joint project study without encountering serious opposition. The committee has approved funding for feasibility studies on the Maine tidal project under a 1975 resolution which still is in effect.

Case indicated there have been only preliminary discussions with administration energy officials regarding Quoddy as part of a joint system with Dickey-Lincoln. A former Muskie aide, Elliot Cutler, has been named by Carter to coordinate congressional passage of the White House energy plan. Case said the combined proposal has not been discussed with Cutler yet.

"That is one direction we have asked the corps to look at," said Case, who indicated that Congress could approve funds for the Maine tidal project even though it does not meet the standard economic criteria. The project could be established as a demonstration program, for example, similar to the proposed synthetic fuel plants. Case conceded there is a weakness in that path, since there is only one other potential site in the country, which is located in Alaska.

"If we were going to build hundreds of tidal plants they might buy it, but in this case, we could only build one other," he indicated.

Environmentalists will almost certainly oppose any plan to combine Quoddy with Dickey-Lincoln, arguing that the proposal is just another maneuver to salvage Dickey.

Peter Helmann, the head of the resource council's energy committee, said that "the argument against Dickey-Lincoln is so strong that an inclusion of Passamaquoddy would probably not change our position."

"It would take an act of God," according to Helmann, to get the council to drop its opposition to Dickey-Lincoln.

Muskie aides, however, insist public support is beginning to swing toward Dickey-Lincoln and they feel a revival of the 1960s joint Quoddy-Dickey-Lincoln project could accelerate that trend.

Cobscook Bay Tidal Power Feasible - Eventually

by Robert French

The U.S. Army Corps of Engineers released a preliminary economic report on 13 potential Cobscook Bay tidal power sites on August 13th.

The report states that while none of the projects can be economically justified at the present time; e.g., their benefit-cost ratios are less than 1, it is only a matter of time before they do become economically feasible. While construction costs for a tidal power plant remain essentially fixed, aside from inflation, costs of alternative methods for generating electricity are projected to increase at a much faster rate. For instance, in its comparative cost analysis, the report makes use of a price of \$16.00 for a barrel of oil, which has increased quite dramatically in the intervening time since January when the analysis was performed. If the price per barrel of oil is calculated at \$24.00 per barrel, and if there is a 5% annual fuel escalation rate, several of the sites achieve benefit-cost ratios on the order of 1.25, a figure where the projects presumably could be economically justified.

The Corps studied projects ranging in capacity from 15 to 450 megawatts in

power, and from \$25,000,000 to \$350,000,000 in cost. The largest project would be a completion of the project started in 1937 under the Roosevelt administration, with dams connecting Treats Island to Eastport and Lubec. Other projects include dams connecting Swards Neck in Lubec to Shackford's Head in Eastport, Swards Neck to Birch Point in Perry, crossing the mouth of the Pennamaquan River in Pembroke, and the Half Moon project near Quoddy Village which is currently being looked into as a demonstration model by the Passamaquoddy Indian Tribe.

The Corps found that single pool arrangements were preferable to double pool or linked pool arrangements due to their considerably lower costs, even though a more steady flow of electricity can be achieved with the two pool systems. In a single pool arrangement, power can only be generated at high and low tides, necessitating the coupling of the project with other plants in order to achieve a more steady flow of electricity.

The study found that six of the larger projects were sufficiently close to economic justification; that they merited further study, and will submit the complete report to Congress next year for its consideration. Copies of the economic study report may be obtained by contacting the Army Corps of Engineers, New England Division, 424 Trapelo Road, Waltham, Mass. 02154.

Danish freighter arrives in Eastport for frozen fillets

Eastport was a busy shipping port for a twenty-four hour period last week as frozen herring fillets from the Mearl Corporation were loaded by large cranes onto the Danish freezer ship "Snowdrop". The 200-foot freighter arrived in Eastport early Saturday morning, August 11th. The large red and white vessel was escorted from the outside of Campobello Island to the Eastport breakwater by the Mearl Corporation seiner, "Christina M." with Bill McCarvey of Eastport as captain.

The frozen herring fillets, packed on wooden pallets, were loaded throughout the day. The ship departed Eastport Sunday morning with its Mearl Corporation cargo headed for ports of call in New Brunswick and Quebec before sailing for Europe.

While the ship was in port, the breakwater had been roped off by the sheriff's department to restrict traffic in the loading area. Arrangements for the arrival of the ship were made by the Eastport Port Authority. The eleven member crew aboard the "Snowdrop" were from the Faeroe Islands, a group of Danish Islands in the North Atlantic, that has provided sailors for the Danish fleets for centuries.

In September of last year another Danish ship, "The Icecap", tied up at the Eastport breakwater to take on more than 350 tons of frozen fish for delivery to Germany. In February of 1977, the 470 foot Swedish freighter "Arizona" spent two weeks at the Eastport breakwater awaiting a shipment of potatoes. The ship later transferred to Searsport to pick

up the potatoes.

The arrival of the Danish ship this past week came at a time when Eastport Port Authority members are working on plans to provide an area at Kendall's Head for a port-park complex that would handle shipping on a regular basis.

Deer Island - Eastport ferry operating

The Deer Island ferry has resumed its regular scheduled crossings from the island to Eastport after a temporary three-week shutdown caused by mechanical problems.

Troubles started with a break in an oil line which caused the engine to seize for lack of oil. According to a spokesman for the ferry service, there was a heavy fog that day and the crew members were busy watching the radar screen and failed to notice the oil line break.

Although there has been some decline in traffic between Eastport and Deer Island which is attributed to the gas shortage in the States, traffic from Deer Island to Eastport has been good this season which the ferry spokesman attributes to the work done by the tourist information offices.

It is a welcome sight once again to see the freshly painted blue and white ferry taking cars, campers, trucks and passengers between Eastport and Deer Island Point.



FRIDAY 24 AUG 79
THE QUODDY TIDES

Army engineers still don't like tides

Advocates of lunar energy were dealt another blow last week as the U.S. Army Corps of Engineers concluded once again that the old dream of harnessing the 25-foot tides near Eastport to generate electricity would not be economically justified.

The Corps said even with the allowances made for rising costs of oil, the project would not pay for itself. "We could not overcome the major disadvantages inherent to a tidal project," said Corps' New England Division Engineer Colonel Max Scheider, "namely, the high initial cost and the inability of a tidal installation to produce 'dependable' generating capacity because the lunar cycle may be out of phase with the demand for electricity at any given time."

Muskie on Quoddy

In his latest communication from Washington, Maine U.S. Senator Edmund S. Muskie noted that the Army Corps of Engineers is likely to report to the Congress in the near future on a study involving the feasibility of harnessing the tides of Passamaquoddy Bay. The senator anticipates the report will state the project would cost "more in dollars than it would earn back in power benefits."

Muskie declared he believed such a conclusion warranted. But, he suggested the proposal might well be kept on the back burner as one that might be economically viable some time in the future. This makes

sense. The steadily increasing cost of all kinds of fuel used to create energy could make Quoddy attractive at some point in time.

It is refreshing at least not to have Quoddy mentioned by some politician as a lure for votes. It has been used far too often upon the people of Maine as a kind of carrot on a stick is utilized to encourage a stubborn mule to move forward.

Bethel Oxford
County Citizen
Bethel, ME
Sept. 6, 1979

Local Journal #214
Bethel, ME
Sept. 6, 1979

This Week in Washington

by Sen. Edmund S. Muskie

Passamaquoddy

The Army Corps of Engineers will soon formally report to the Congress that the 60 year old plan to harness the tides in the Passamaquoddy Bay area would cost the country more in dollars than it would earn back in power benefits.

I believe the Corps' analysis was technically correct, but it was disappointing nevertheless. I believe we must continue to examine Quoddy, especially in comparison with synthetic fuel projects, before we conclude that the project should be put back on the shelf. And I will be working this fall to give the Corps the encouragement it needs to keep Quoddy alive.

The idea of harnessing the tides in the Eastport-Lubec area was advanced in the 1920's, and construction was actually begun in 1935 in Cobscook Bay.

After World War II, a huge international project was proposed and extensively studied, but this study and subsequent reviews all concluded that the project by itself was not economically feasible.

It was in the postwar study that the Dickey-Lincoln School hydroelectric project on the St. John River was proposed as a way of "smoothing out" the power production from the tidal project.

Because there are two brief periods of slack tide each 24 hours, the tides by themselves cannot produce steady power at times of day corresponding to the daily peak demand for energy. Dickey-Lincoln was proposed as a way of filling those gaps.

It was later determined that Dickey-Lincoln by itself was economically viable, and it has been the focus of efforts to gain federal financing for an energy project for our region.

In 1975, after the Arab oil embargo and the subsequent four-fold increase in the cost of imported oil, I thought it would be a good idea to take another look at Quoddy, and at my request the Senate Public Works Committee

approached the Army Corps to do so.

The Corps attempted in its analysis to judge Quoddy against the increasing price of oil over the next 50 years.

The Corps looked at several projects of varying size and energy capacity. It determined a "Benefit to Cost Ratio" for each. The ratio measures costs against benefits from the sale of power. A one-to-one ratio — one dollar earned for each dollar spent for construction—is considered the minimum necessary for Congress to approve construction money.

Each of the alternatives fell short of that one-to-one standard, but at least one alternative came very close, and the Corps concluded that the project was extremely sensitive to oil price increases. That is, if the price of oil went up three or five percent a year faster than inflation, a tidal project would make economic sense over time.

The Corps also noted that if the construction begun in 1935 had been completed, we would today consider the project to have been a bargain.

These two facts are the heart of the matter. Oil prices are on the rise. Everyone knows it. But no one knows how high they will go. It might make sense to build Quoddy now, even if we are not absolutely certain oil prices will continue to escalate.

We are taking a similar approach with synthetic fuels—oil and gas from coal, oil from shale and alcohol from waste materials. We are not absolutely certain that these products will ever be economically on a par with oil from wells. But we are certain enough to be giving serious consideration to a massive program of synthetic fuels development.

I will also ask the Corps to take another look at a project which combines the power from Quoddy with power from Dickey-Lincoln. Dickey's cost-benefit ratio is still on the rise. Perhaps combining the two will make economic sense.

There may be other avenues to pursue, and I will explore them all in coming weeks.

QUODDY AND DICKEY

Bucky Fuller puts \$1-million-a-gallon oil in the equation

"I believe the Corps' analysis was technically correct, but it was disappointing nevertheless," said Senator Edmund Muskie (D-Maine) of the U.S. Army Corps of Engineers' recent conclusion that the 60-year-old plan to harness the tides in the Passamaquoddy Bay area, is, despite skyrocketing oil prices, still not economically feasible.

Others recently expressing disappointment with the Corps' conclusion have not been as easy on the Army analysts. Normand Laberge, director for the Passamaquoddy Tribe's tidal power project at Half Moon Cove in Perry, has challenged the assumptions and methodology behind the Corps' conclusion, while visionary and Maine summer resident Buckminster Fuller has called the Corps' cost-benefit analysis "deliberately fraudulent."

In a telegram he sent last week from his summer residence on Penobscot Bay to Senator Muskie, Fuller announced his support of tidal power and other proposals to develop Maine's hydroelectric potential, expressing his wishes that "the great Cosmic Wisdom and Power may back your backing of Quoddy and Dickey-Lincoln."

Fuller said in the telegram that the cost-benefit analyses which have cast doubt on the economic feasibility of generating power from the OPEC-proof, renewable energy of falling water, are based on an "utterly preposterous underestimation" of the value of oil. Fuller shared with the Senator some "tactical information" on this subject which, he said, "if popularly comprehended can swing public and Congressional will into successful support of your effort."

Fuller noted he had once asked a leading oil geologist to write up the geologic scenario by which vegetation decomposed and was heated and was pressurized over the millenia into our oil

reserves, and asked the geologist to then estimate how much it would cost, using power company electricity; to reproduce the heat and pressure necessary to produce a gallon of oil. One year of calculations later, the geologist told Fuller the bill came to more than \$1 million per gallon.

"Selling a million dollar gallon for one dollar ranks with the sale of Manhattan for a bottle of whiskey as profound wisdom," Fuller argued. One given to cosmic analogy, Fuller likened the oil companies' claim to the oil reserves, and their selling it for the cost of the labor and equipment necessary to get it out of the ground, to "saying that the New York City bandits would be earning an honorable living if they devised a way of drilling in through the bank roof and putting a vacuum tube down into the teller's cases to suck out the money."

Fuller had few sympathies for the snail darters, houseworts and other endangered species which stand in the way of Dickey, Tellico and other such projects. The earth has already suffered through four known ice ages, the latest just 30,000 years ago, Fuller noted, and "the face of nature is continually evolving; many species have become extinct because unfit for the environmental changes."

"Don't listen to the politically-organized environmentalists. Do listen to the individuals who love and respect nature. If the St. John's water basin is a bit bigger, we will have just so much more beautiful shoreline. Water is beautiful too."

But Muskie hasn't entirely given up on the tidal power project, despite the Corps' analysis. "I believe we must continue to examine Quoddy, especially in comparison with synthetic fuels projects," he said, "before we conclude that the project should be put back on the shelf." Muskie

noted that if oil prices increase faster than the general rate of inflation, a tidal power project might become economically feasible over time. "It might make sense to build Quoddy now, even if we are not absolutely certain oil prices will continue to escalate," Muskie said. The Senator said he would ask the Corps to take another look at a project which combines the power from Quoddy with power from Dickey-Lincoln.

If the federal government had had the foresight to move ahead with the Cobscook Bay tidal power project when it was first being considered in 1936, argued tidal power proponent Normand Laberge, it would today be producing power for about 0.78 cents per kilowatt-hour, which is about one-quarter of the per kilowatt-hour charge on Mainers' monthly electric bills.

Laberge argued that the Corps "relative price shift analysis" which takes into account escalation of oil costs faster than the rate of inflation, had nevertheless underestimated the value of power from various tidal power projects considered for Cobscook Bay.

In particular, Laberge said the Corps "inaccurately presented and analyzed" the tidal power feasibility at Half Moon Cove, by, among other things, assuming a much smaller than optimum plant capacity. The Corps had estimated the cost-benefit ratio of such a project was .30, meaning that only 30 cents of power benefits would result from each dollar invested on the project. Laberge said his own analysis, based on "life-cycle cost analysis" had estimated a .77 cost-benefit analysis ratio. Inflation in oil costs would likely bring the economic break even point of such a project within four to six years, Laberge said, in contrast with the eighteen years estimated by the Corps.

The Corps had noted in its analysis that power

from a tidal project would be unreliable, as the output from such a project would correspond to tidal rhythms, rather than with surges power demands. Laberge argued, however, that "you know exactly when high and low tides occur over a year," and that power from a tidal project, especially one with a small output like the Half Moon Cove project, could be planned for with certainty and worked into the regional power grid.

Laberge said that although the Corps' analysis was biased toward large projects for Cobscook Bay, small ones might make more sense. Among other things, the "lead time" could be sharply reduced by going with a small project. "The Army Corps of Engineers said a large project couldn't be on line for 16 years," Laberge said. "The project we are working on could be on line by 1985 or '86."

Buckminster Fuller Endorses Dickey

PORTLAND (AP) — Philosopher and architect R. Buckminster Fuller has endorsed the Dickey-Lincoln hydroelectric project, Sen. Edmund S. Muskie announced Tuesday.

Fuller, a long-time resident of Bear Island off the Maine coast, sent Muskie a telegram in which he expressed support for both Dickey and the proposed Passamaquoddy tidal power project off Eastport.

"Don't listen to the politically organized environmentalists," Fuller advised Muskie. "Do listen to the individuals who love and respect nature."

"Congratulations and our wishes that the great cosmic wisdom and power may back your backing of Quoddy and Dickey-Lincoln," Fuller said in his telegram to the Maine Democrat, a longtime supporter of the St. John River hydro project.

Keeping Quoddy Alive

The Army Corps of Engineers is expected to report to Congress that the harnessing of the high tides in Passamaquoddy Bay is not economically feasible, even in the light of the present high cost of oil. U.S. Senator Edmund S. Muskie is disappointed at the finding, but wisely will be encouraging the Corps to keep Quoddy alive.

The engineers studied several projects of varying size and energy capacity and determined the benefit to cost ratio for each. Each of the alternatives fell short of the one-to-one ratio of one dollar earned for each dollar spent for construction, Sen. Muskie said in a recent newsletter. In time, as oil prices continue to rise, the tidal project would become feasible, he explained.

Our senior senator also wants the Corps to take another look at a project which combines power from Quoddy with power from a hydroelectric dam on the St. John River, at Dickey-Lincoln School. The Dickey power would fill in the periods of slack tides each 24 hours.

Dickey has been given a favorable cost-benefit ratio and the figures still are on the rise, Muskie said. But there is another hurdle to the river project: The Maine congressional delegation is split, with Muskie, the only Democrat, favoring Dickey; and the three Republicans in House and Senate opposed. With such a split, the likelihood of favorable congressional action is very dim.

CENTRAL MAINE
MORNING SENTINEL
WATERVILLE, ME.
D. 25.000

NOV 26 1979

New
England
Newsclip

Army Engineers

Hydropower Symposium Slated Tuesday At Portland

Methods employed by the Federal government in evaluating the economic feasibility of hydropower developments will be discussed at a symposium Tuesday afternoon at the Center for Research and Advanced Study in Portland.

Sponsored by the University of Maine at Orono's Balanced Growth Project, the Maine Of-

fice of Energy Resources, the Maine State Planning Office, and U.S. Army Corps of Engineers, New England Division, the symposium will feature a panel of experts from the academic community, government and the utility industry.

Among the panelists will be Philip Hastings, Central Maine Power Co.; Charles Colgan, State Planning Office; A. Myrick Freeman, III, and William Shipman, of Bowdoin College and Laurence G. Hines, Dartmouth College, economists. Also presenting short papers will be Normand Laberge, Half Moon Cove Tidal Power Project; John Joseph, Maine Office of Energy Resources, and William Beardsley, Bangor Hydro-Electric Company.

Dr. Arthur Johnson, A & A Bird Professor of History and director of the Balanced Growth Project at the University of Maine at Orono, explained that "Because some unconventional analytical techniques have been employed in recent studies of the tidal power in Maine's

Cobscook Bay, the Corps of Engineers is anxious to obtain expert opinions from academic, business, government and consumer interests in a give-and-take discussion of extremely complex economic factors."

According to Dr. Johnson, since 1935 several studies have been performed, all of which have concluded that tidal power could not compete economically with alternative energy generation technology.

Dr. Johnson said the Federal government must apply fairly rigid standards and economic principles in evaluating projects because public funds are involved. However, he noted a trend toward more flexibility seems to be developing.

NOV 30 1978

New
England
Newsclip

Rising Fuel Costs Up Hydro Benefit

By CLARK T. IRWIN JR.
Portland Press-Herald

Suppose you need a new home heating system.

You're about to convert to natural gas heat, but your oil dealer offers you such a bargain on a new furnace that your total heating costs this winter will be the same either way.

Would you make your choice by assuming that oil prices will not go up in the years to come?

Most likely not.

But in comparing large hydro-electric projects to fossil fuel alternatives, the Army Corps of Engineers has been required by law to assume just that.

A panel including economists and utility representatives recently discussed a different way of assessing future benefits at a conference at the University of Southern Maine in Portland.

The technique above, is called "Relative Price Shift Analysis."

In comparing proposals like the Dickey-Lincoln dams or the Cobscook Bay Tidal Power Project with oil-fired generating plants to supply electric power, the relative price shift method tends to make the hydro plants look more attractive.

That is, if you define as a "benefit" the costs saving of using hydro rather than

oil power, then allowing for oil price increases in the future will make the no-fuel-cost dam or tidal pool look more economic than would assuming a constant oil price.

Relative Price Shift Analysis "is a sound theoretical technique for both the public and private sectors," said William H. Beardsley of the Bangor Hydro-Electric Co.

The other seven panelists agreed, though everyone expressed some reservation or caution about the method, chiefly about the difficulty of making good predictions of changes in prices, efficient technologies, conservation efforts and substitutes for electricity.

If Relative Price Shift Analysis had been applied in the 1930s, Bowdoin College economist William D. Shipman said, "We might have the Passamaquoddy Tidal Power Project now and be very glad for it."

However, he added, "Trying to predict the course of technology and its impact on costs is extraordinarily difficult to do well." Given that a large hydro project can last 100 years, Shipman said, it's important to anticipate cost changes of alternative generation and demand shifts.

A skeptical note was injected by Dartmouth College economist Lawrence G.

Hines. He thought applying the relative price shift technique in the hydro-vs. oil question introduced "extraordinarily disproportionate upward adjustment of benefits" through hold all costs constant except the fuel of the competing oil-fired unit.

Nuclear and coal power were not discussed because of their base-load (around-the-clock) role compared with hydro's cyclical nature, plus regulatory impediments to their construction in the foreseeable future.

Hines said the effect of Relative Price Shift Analysis would be consistent with what he called the Corps of Engineers' "aggressive benefit recruitment" in studying projects.

The Corps, Hines said, typically counts as project "benefits" such things as wages paid during dam construction, though they are a tax cost to other citizens; and increased downstream property values, though upstream property values are reduced through the immersion of logging land.

Such transfers are "not a net gain" to society and should not be counted as project benefits, Hines argued, because they could flow from any number of other projects and represent merely transfers of income.

Barring modification of Corps benefit

definitions, Hines said, the relative Price Shift Method looked to him like a guarantee that more Corps studies would be found to have favorable benefit-cost ratios.

But as economist A. Myrick Freeman III of Bowdoin, "What's the alternative?"

The Corps' current technique of assuming that alternative fuel prices won't rise is itself a prediction, Freeman observed, so the question is how good an estimate can be made rather than whether it should be made.

Col. Max B. Scheider of the Corps of Engineers summed up by telling the panel that even if Corps studies should be restricted to the old technique, it could be helpful to "display all the alternatives" for comparing hydro and oil-fired plants benefits and costs.

Other speakers represented Central Maine Power Co., the Maine State Planning Office, the Office of Energy Resources and the Half-Moon Cove-Tidal Power Project. The panel was sponsored by the Corps, the USMC Center for Research and Advanced Study, and the University of Maine balanced growth project under Prof. Arthur Johnson of Orono.

JAN 16 1980

New
England
Newsclip

Application expected for tidal power study

Army Engineers
By Mary A. Look

NEWS Correspondent

LUBEC — A spokesman for the state's Resource Planning Office expects to receive an application from a consortium of Cobscook Bay towns, requesting a grant of \$8,000 to study the socio-economic environmental impact of an integrated tidal power project.

David Keeley, a planner with the state's energy impact program, said Tuesday that he has been informed that a tidal power committee has been formed, and intends to submit a letter of intent and a full application by Feb. 1 for the \$8,000 study involving proposed small tidal power projects at both Coffin's Neck in Lubec, and Half Moon Cove in Perry.

Last year the state approved a \$7,500 grant for a study of the environmental effects in Half Moon Cove.

The committee of concerned citizens officially organized on Jan. 12 at Lubec and selected a roster of temporary representatives from each community in attendance. Among the 20 persons attending, committee members were selected from Lubec, Perry, Eastport, Dennysville, and the Passamaquoddy Indian community from Perry.

Permanent members of the Cobscook Bay area committee will be chosen at the forthcoming meeting in the Lubec Town Office on Feb. 16, at 3 p.m. Proposed by-laws will be acted upon. The committee is seeking to encourage the development of tidal power.

According to acting chairman of the group, Robert Voight of Lubec, the Feb. 16 meeting will also involve the election of two associate members who will be available to serve in the absence of a regular committee member. Representatives of Pembroke will be notified and urged to attend, because the community will be affected by the project.

In addition to Voight, who also serves as chairman of the Economic Development Committee of Lubec, members of the bay community are: Nathan Cohen and Harry Vose of Eastport, Scott Pottle and Richard Gove of Perry, Charles Lookabaugh and Voight of Lubec, Leonard Lyons and James Sullivan of Dennysville, and Cliv Dore and Reuben Cleaves of the Indian community at Pleasant Point.

Dr. Norman Laberge, who was hired by the Passamaquoddy Tribe to head the Half Moon tidal project for the tribe, will serve as technical consultant for this committee.

According to Voight, the consolidated study effort will be directed at the construction of tidal power plants capable of supplying a substantial portion of the electrical demand for the surrounding region. The present climate of uncertain energy supplies and escalating electrical cost has been the prime driving force behind the establishment of this committee.

The recent history of tidal power development in Cobscook Bay dates back to 1919 when Dexter Cooper first proposed a project for harnessing the tides for electrical generation. This renewable resource has never realized its practical potential due to economic constraints.

Voight indicated that with the price of electricity currently approaching 6 cents per kilowatt hour for residential users and with the geo-political uncertainties of energy supplies, the committee feels that tidal power once again deserves serious consideration.

Recent studies for small tidal projects have estimated that the production cost of electricity would be approximately 5.5 cents per kilowatt hour. This comparison is especially noteworthy when considered over the project's lifetime and evaluated in terms of inflation, environmental concerns, and rising oil costs.

The chairman said the primary objectives of this committee are not directed at the reincarnation of the large-scale Quoddy project recently championed by the U.S. Corps of Engineers.

As a more viable option, the committee envisions a series of small interconnected tidal plants for the region which would have eventually several plants operating in tandem to provide continuous power.

An engineering study for the Half Moon project is currently underway and it is expected that study will be completed by the summer of 1980.

JAN 25 1980

New
England
Newsclip

Tidal power euthenics in Cobscook Bay

The definition of euthenics is science concerned with bettering the condition of human beings through improvement of their environment.

A committee of interested and concerned citizens from the Cobscook Bay region has been formed for the purpose of encouraging the development of tidal power. This effort will be directed at the construction of tidal power plants capable of supplying a substantial portion of the electrical demand for the surrounding region. The present climate of uncertain energy supplies and escalating electrical cost has been the prime driving force behind the establishment of this committee.

The recent history of tidal power development in Cobscook Bay dates back to 1919 when Dexter Cooper first proposed a project for harnessing the tides for electrical generation. After over sixty years of discussion and a countless number of studies, the tides continue to ebb and flow in an unending pattern untapped by man's technology. This renewable resource has never realized its practical potential due to

economic constraints. However, today, with the price of electricity approaching 6¢/kwh for residential users and with the geo-political uncertainties of energy supplies, tidal power once again deserves serious consideration. As a comparison, it should be noted that recent studies for small tidal projects have estimated that the production cost of electricity would be approximately 5.5¢/kwh. This comparison is especially noteworthy when considered over the project's lifetime and evaluated in terms of inflation, environmental concerns, and the rising cost of oil.

The primary objectives of this committee is not directed at the reincarnation of the large-scale Quoddy project, most recently championed by the U.S. Corps of Engineers. As a more viable option, a series of small interconnected tidal plants is envisioned for the region which would supply regional power and also assist economic development. A local initiatives approach for tidal power development will not only ensure public input, but also significantly improve the chances for act-

ually constructing a tidal project.

News on the committee's program will be reported at regular intervals. The committee will focus on issues instrumental to achieving its goals and objectives and to prepare the necessary documentation for the implementation of plans.

A meeting of the Tidal Power Committee was held at the municipal building in Lubec on Saturday, January 12, with Robert Voight as acting chairman. Representatives were present from Lubec, Eastport, Dennysville, Perry, and Pleasant Point.

Mr. Voight introduced Dr. Normand LaBerge, Tidal Project Manager for the Passamaquoddy Tribe and the Half-Moon Cove tidal project, who talked about proposed plans to utilize the tides in the area. He mentioned Coffin's Neck in Lubec as a second site for a power dam and other sites along the bay that could be used as reserves.

The Half-Moon Cove project is located at the site of the old Eastport-Perry toll bridge. At a meeting last summer with Dr. LaBerge it was agreed that the five towns in the area would work along with him in an effort to secure funds for a tidal power project that would furnish electricity to all residents in the Cobscook Bay region.

The following members were nominated to be on the Tidal Power Committee to represent each town: from Eastport, Nate Cohen and Harry Vose; from the Passamaquoddy Indian Reservation, Cliv Dore and Reuben T. Cleaves; from Lubec, Robert Voight (acting chairman) and Charles Lookabaugh; from Perry, R. Scott Pottle and Richard E. Gove; from Dennysville, Leonard Lyons and James C. Sullivan.

This committee will look over the proposed sites, study the problems of construction and work out details in applying for grants. An application for a grant of \$5,000 will be submitted to the State Planning Office by Feb. 1 for the purpose of conducting a study of a tidal power project at Coffin's Neck, Half-Moon Cove and other sites.

The next meeting will be held at the municipal building in Lubec on Saturday, Feb. 16 at 3:00 p.m.

SUNDAY
TELEGRAM
PORTLAND, ME.
S. 117.562

MAR 30 1980

New
England
Newsclm

State has plans for system of coal-fired plants

By FRANK SLEEPER
Staff Writer

WATERVILLE — The director of Maine's Office of Energy Resources Saturday proposed that a series of small, coal-fired electric power plants be constructed across the state to meet its future power needs.

Speaking as part of a panel at the 29th Colby Institute for Management at Colby College here, OER Director John Joseph said such plants should first be built near the state's largest cities or at its pulp and paper mills.

The process steam generated by the plants, now generally lost as waste, could be transferred outside the plant for heating in other facilities, Joseph said.

"The availability of such heat would be a good economic development tool," Joseph said. "New industries are interested in such heat in this era of high oil costs."

Joseph said his agency had been working on plans for such a system of plants for the past 1½ years.

He said the plants would use the new, so-called "fluidized bed" process, which allows coal-burning plants to operate in a manner that does not violate air pollution standards.

Joseph said such plants, especially those operating in conjunction with the pulp and paper companies, can also be run on wood.

The businessmen attending the conference also heard professor Richard Hill of the University of Maine at Orono Engineering Department

say that the present Army Corps of Engineers Passamaquoddy Tidal Power Project would supply only three-tenths of 1 percent of Maine's present electric power use.

"That project really seemed huge when Dexter Cooper conceived it, and well into the 20s and 30s," Hill pointed out.

"But now it seems so small that it really makes no difference in the overall Maine electric power picture," he declared.

Hill also said the proposed Dickey-Lincoln project on the St. John River also seemed small now in relation to the state's total power use picture.

However, he said, he voted in favor of building it when he served on Gov. James B. Long-

ley's task force on Dickey-Lincoln. One of the reasons he did so was that Canada probably would sell this state about half of the 350 million kilowatt hours of power it would be able to produce with the dams that country planned to build on the St. John after Dickey-Lincoln was completed.

John G. Buckley, vice president of Northeast Petroleum Industries of Boston, predicted that the price of residual oil, used by Maine industry, will level off and perhaps even go down in 1980. The price of residual may rise after January 1981 with further price hikes by the OPEC nations.

The price of residual oil has dropped about \$5 a barrel in the past five weeks.

BANGOR DAILY PRESS
BANGOR, ME.
D. 78478

JUL 1 1980

New
England
Newsclip

Quoddy revisited

U.S. Army Eng
As soon as Maine's junior U.S. senator, George Mitchell, finds himself fully extracted from among the dwindling ranks of Dickey Dam supporters he really ought to find himself a monumental cause.

Ed Muskie had clean air. Bill Hathaway had Dickey-Lincoln. Bill Cohen had Richard Nixon.

A cause is good for any aspiring leader's career. If he is lucky enough to seize one that lends to the greater good as well as keep his name from disappearing into visibility gulch, all the better.

We have one for Sen. Mitchell: Passamaquoddy Bay Tidal Power.

The so-called "cost-benefit" ratios of the oft-touted tidal power concept are reportedly within the realm of feasibility now. It isn't cheap to harness tidal power, but the relative cost figures are dropping every day.

Unlike nuclear fusion and other threshold forms of alternative energy, tidal power technology is here. France has done it. And by late 1983, Canada will be operating a 20 megawatt tidal plant in the Bay of Fundy.

Although the tidal power investment is currently about double the cost of nuclear-generated electricity, tidal plants rely on an inexhaustible fuel and are free of the risk factors associated with nuclear energy.

With the British, Japanese and South Koreans taking serious looks at tidal power projects for their respective coasts, Sen. Mitchell might be the man to lead the resurrection of an old idea whose time may have already come without our national leadership even recognizing it.

SUNDAY
LEGRAM
PORTLAND, ME.
\$ 117.562

MAR 30 1980

New
England
Newsclip

State has plans for system of coal-fired plants

By FRANK SLEEPER
Staff Writer

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Joseph said such plants, especially those operating in conjunction with the pulp and paper companies, can also be run on wood.

The businessmen attending the conference also heard professor Richard Hill of the University of Maine at Orono Engineering Department

say that the present Army Corps of Engineers Passamaquoddy Tidal Power Project would supply only three-tenths of 1 percent of Maine's present electric power use.

"That project really seemed huge when Dexter Cooper conceived it, and well into the 20s and 30s," Hill pointed out.

"But now it seems so small that it really makes no difference in the overall Maine electric power picture," he declared.

Hill also said the proposed Dickey-Lincoln project on the St. John River also seemed small now in relation to the state's total power use picture.

However, he said, he voted in favor of building it when he served on Gov. James B. Long-

ley's task force on Dickey-Lincoln. One of the reasons he did so was that Canada probably would sell this state about half of the 350 million kilowatt hours of power it would be able to produce with the dams that country planned to build on the St. John after Dickey-Lincoln was completed.

John G. Buckley, vice president of Northeast Petroleum Industries of Boston, predicted that the price of residual oil, used by Maine industry, will level off and perhaps even go down in 1980. The price of residual may rise after January 1981 with further price hikes by the OPEC nations.

The price of residual oil has dropped about \$5 a barrel in the past five weeks.

OCE
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JUL 26 1980

New
England
Newsclip

Tidal power project gets permit

By David Platt
NEWS Environment Writer

A small effort to harness the tides of Cobscook Bay to produce electricity is still in the study stage, but the director of the project says that the rising cost of oil has already made tidal power economical in the United States for the first time.

The Federal Energy Regulatory Commission issued a permit for the Half-Moon Cove tidal power project on June 19. According to Dr. Normand Laberge, project director, the permit was the first issued for a tidal power project since 1926.

Laberge sent a progress report to interested individuals, groups, agencies, and organizations this week.

Laberge said that the Charles T. Main Company of Boston will complete a preliminary engineering study in late October. The study, said Laberge, "will provide the basic information on the project's technical and economic feasibility.

Earlier studies have recognized the project's technical feasibility, but have also indicated a marginal degree of economic return based on conventional benefit-to-cost analysis," he noted.

"However, the use of life-cycle analysis and the increasing cost, both monetary and environmental, of non-renewable sources of electricity is expected to increase the present day and future value of tidal power beyond the threshold level and thereby enable the construction of the first tidal power plant in the United States," said Laberge.

The present plan is for the plant to generate 15,000 kilowatts, using both the incoming and outgoing tides.

For the past three years there has been an aquaculture project under way in Half-Moon Cove, which Laberge characterized as "unable to progress into a commercial operation beyond the preliminary stage."

But construction of the tidal power facility, said Laberge, "will significantly enhance the economic viability of aquaculture within the impounded tidal basin by increasing the summertime water temperatures and by creating additional areas with adequate water depths."

Laberge also said that he plans to study how the Half-Moon Cove project might be integrated into a network of small tidal-generating stations in the region.

This approach is being advocated by the Cobscook Bay Tidal Power Committee, representing surrounding communities, which meets regularly.

"The Half-Moon Cove project," said Laberge, "would serve as the first link in this proposed system which optimizes the small-scale tidal power potential of the region."

In his report, Laberge also noted that the U. S. Army Corps of Engineers is kept regularly informed of progress, that he tentatively plans a conference at the Pleasant Point Reservation later this year to describe and discuss project plans, that there was an aquaculture lease hearing in Eastport involving two five-acre tracts in Half-Moon Cove (a decision will be made later this month), and that he is working to identify sources of funding for the project should it prove feasible.

COURIER-GAZETTE
ROCKLAND, ME.
W. 9,013

OCE
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JUL 22 1980

New
England
Newsclip

WILLIAM S. COHEN

Recently, I was gratified to learn of the formation of the Cobscook Bay Tidal Power Committee. The committee, which is comprised of representatives from the Maine communities of Eastport, Perry, Pembroke, Dennysville, Whiting, Lubec, and the Pleasant Point Tribal Council, was formed to carefully examine the feasibility of tidal power development in the Cobscook Bay region of eastern Maine.

Technological advancements in harnessing the tides have been rapid in recent years. Great Britain, Canada, and France, to mention just a few countries, have devoted millions of dollars to the study of and experimentation with tidal power prototypes. Canada plans to construct a large-scale prototype in the Bay of Fundy. France is already operating small scale models.

Maine is one of only two areas in the United States where tidal power appears to be feasible, the other being Alaska. One of the most promising areas is Passamaquoddy Bay. It is significant, I believe, that the search for power generation in Maine increasingly leads researchers time and again to the potential in and around Passamaquoddy Bay.

I have long felt that the potential of tidal power should be closely examined, and I am hopeful that the formation of the citizens committee will accelerate both inquiry and interest in several projects designed for Cobscook Bay. The Army Corps of Engineers has studied six alignments for barriers between islands off the coast at Eastport. Two projects — the Goose Island and Birch Island alignments — are now receiving further study by the Corps.

The citizens committee is seeking an \$18,000 grant from the Department of Energy to pursue study of the projects concurrently

with the Corps. The Tribal Council at Pleasant Point has already received money to study the feasibility of a tidal project at Half Moon Cove. I fully support these local activities which will create wider interest in tidal power, as well as serve to answer questions about tidal power local residents might have.

I contacted the Army Corps of Engineers in Boston to discuss the ongoing studies of these projects. The update that I received was encouraging. Although the Cobscook Bay studies did not receive funding in the fiscal year 1981 budget, the Corps assured me that the money on hand was sufficient to complete a full economic analysis of the projects under consideration. The study will be released sometime during the coming fall. Environmental impact statements would have to be started if the Corps decides that any of the projects are economically justified.

The energy crisis in New England, and particularly in Maine, is rife with danger, but equally ripe with opportunity. I support Maine residents in their search for alternatives to dependence on imported foreign oil. I commend Maine residents for their realization that our state's energy future depends as much on fully utilizing alternatives, such as tidal power, as on effective conservation of energy.

Maine can serve as a model for the New England region, and indeed, for the entire country. There is no wisdom in worrying about future dangers. Maine's wisdom lies in its citizens' serious and timely investigation of alternative energy opportunities. This is the course that I am confident will result in a secure energy future.

DLS

PORTLAND PRESS
HERALD
PORTLAND, ME
B. 1980

AUG 21 1980

Engines
National

Horse sense lacking

If the environmentalist nuts would organize behind a cause that is founded on plain horse sense they could get enough votes to swamp nuclear power.

But what do they do that doesn't make sense? They say nuclear power is dangerous so they want to ban it. If we vote to ban it what power do we use this winter? Import electric power from Canada? Sure, at high rates.

Can we use coal? When the cement plants at Rockland imported coal from Pennsylvania this spring, the environmentalists screamed it was full of sulfur, so they opposed its use—unsuccessfully.

Use hydro power, say the environmentalists. But when Dickey Lincoln is pushed in Congress, the "environ nuts" yell that agricultural and forest land will be flooded.

Use an oil refinery at Eastport so oil fuel and byproducts can be used to generate power and other products. Sounds like a good idea. But the environs yell to high heaven about protecting eagles and certain fish.

Use hydro power, yell the environmentalists. Use the 50-odd dams on our rivers that electric generating plants once used. But they forget it will take plenty of time. The dams have to be repaired or rebuilt, generating stations and generators have to be installed, power lines set up. This will take more than a dozen years.

In the meantime what do we do during the long, cold winters?

Canadian provinces on the Bay of Fundy are already preparing to build tidal power stations. Our Army Corps of Engineers has made seven studies of tidal power at Quoddy. Six evade the answer and the seventh said Quoddy tidal power was not feasible.

If the environmentalists would back this cause and keep Maine Yankee power for a few years, we might have something really good.

Linwood S. Elliott

Falmouth

MAINE SUNDAY
TELEGRAM
PORTLAND, ME.
S. 11.50

AUG 24 1980

Non
Engl
Newslig

Emery queries sportsmen and gets loads of feedback

U.S. Army Corps
Nearly 6,000 Maine sportsmen participated in Congressman David F. Emery's questionnaire opposing such things as a ban on leghold traps and supporting a federal edict against short-barreled handguns known as Saturday night specials.

Emery said returns to his questionnaire were "phenomenal."

Many sportsmen expressed concern about Atlantic salmon. Seventy-one percent called for an increased effort to improve spawning habitat for these fish in Maine waters, 55 percent supported an international treaty.

Emery said he has protested a cutback in sea-run salmon hatchery programs in Maine, which he said is the result of President Carter's energy guidelines. Forced to cut oil consumption by the 20,000 gallons of oil it takes to heat water and speed growth of young fish, the Green Lake federal hatchery has been forced to return to a two-year instead of the one-year smolt program.

"To sacrifice 200,000 valuable smolts to save a relatively small amount of fuel, seems senseless, a case of cutting off our nose to spite our face," Emery noted.

Among the questions gaining support in the poll were the ban on short-barreled handguns, 3,029 to 2,348 and protecting wilderness areas of Alaska, 4,070 to 1,216.

Participants supported a proposal to add items to gear which would be taxable under the Federal aid to fisheries and wildlife program.

They liked the way Maine paper companies and large landowners are managing their land and how the state is managing its public lots.

Favored 3,158 to 2,145 was the use of chemicals for farm and forest use. Opposed by a slim margin of 17 was a ban against snowmobiles in national parks.

Expanding the federal ban on lead loads for waterfowl hunting to all areas of the country was opposed, 3,417 to 1,847. Merry-meeting Bay is the only spot in Maine where this ban is in effect.

Sportsmen Say



Gene
Letourneau

The most lopsided reply favored a mandatory prison sentence to anyone using a gun while committing a crime. The ballot was 5,250 to 295.

Construction of an oil refinery in Eastport was favored, while construction of the Dickey-Lincoln hydroelectric project on the St. John River was opposed. Construction of the Passamaquoddy tidal power project was favored, 4,068 to 520.

Both fresh and salt water fishermen, lobstermen and aquaculturists complained, Emery noted, that a huge population of cormorants (shags) is inflicting sizeable losses on freshly stocked game fishes in fresh water and salt water.

The complaints charged that fishing weirs, lobster traps and aquaculture facilities are being raided by the shags. Emery reported that as a result of these complaints the U.S. Fish and Wildlife Service surveyed the problem, subsequently issued a number of permits to Maine residents allowing them to control the birds.

For many years Ransome P. Kelley, former chairman of the Waterfowl Advisory Council, has complained about both shags and blackwing gulls and their assaults on both fish and young waterfowl, particularly eider ducks. This is the first indication that some control of either species is taking place.

Emery pointed out in his questionnaire analysis that he withdrew immediately as a co-sponsor of a House bill when he learned it would ban use of live birds and animals

from field trials and the use of live birds in dog training. The original measure had been aimed at banning use of live rabbits in the training of racing greyhounds.

The margin of 63 percent favoring use of leg-hold traps was indicative of the need for trappers to convince their fellow sportsmen that these are the best means of harvesting the wild fur crop, Emery said.

Chips from the Blazed Trail ... New Hampshire's public hearing on waterfowl season dates and bag limits will be held Wednesday at 7:30 p.m. at the Technical Institute in Concord ... Maine's similar hearing is set for Sept. 2 at the Augusta Civic Center ... The Central Maine Brittany Club is having its first licensed trial next weekend at Maynard Albee's farm in Alna ... Stakes will start Saturday morning and include open all age and gun dog, amateur, derby and puppy ... Interest in this diminutive breed of bird dogs has increased considerably in Maine ... Frank Pride and Charles Noble of North Windham are co-chairmen of the trials ... Waters in upstate areas which never really warmed up this summer are cooling rapidly, bringing game fishes to the surface again ... Low water is affecting areas of concentration, particularly of brook trout and salmon ... However, both are being taken in shallow, weedy regions on artificial flies that must be served carefully because of the low, clear water ... Salmon Saturday will be held Sept. 6 by Salmon Unlimited, which is meeting Sunday at the Greenland Veteran's Hall in New Hampshire ... It will include a fisherman's breakfast, a tour of potential fishing spots for coho salmon. Roland E. Tuttle of Kittery can provide more details ... Bob Smith of Old Orchard Beach took a four-pound coho off Camp Ellis breakwater this week, which means the fish are back ... Acworth Volunteer Fire Company of Acworth, N.H. has a big turkey and chicken shoot planned for Aug. 31.

TIDAL POWER

MAINE TIMES
TOPSHAM ME.
W. 13,600

AUG 29 1983

New
England
Newspaper

A small project hopes to pave the way to Dexter Cooper's dream

THIS time around, Dexter Cooper's dream of harnessing tidal waters to produce power will be handled differently.

Instead of the large scale international Quoddy Bay scheme of the 1920s, later linked with the U.S. Army Corps of Engineers' proposal to dam the St. John River in the 1960s, the Passamaquoddy tribe's plans are to build a small demon-

stration project in Cobscook Bay, costing between \$21 million and \$28 million and serving only the power needs of the immediate region. It will also be able to connect with existing transmission lines.

Even though the Corps still has a large-scale project in mind for the Cobscook-Quoddy region, right now the tribe has a recently awarded three-year permit to document the feasibility of a small

tidal project in Half Moon Cove abutting the Pleasant Point reservation near Eastport. With approval, construction could begin as early as 1982.

With a proposed capacity of 10 megawatts, the Half Moon plant would provide 38 million kilowatt hours of electricity a year and would supply most of Washington County (on an intermittent basis). Project manager Normand Laberge pegs

the number of households at somewhere between 5,000 and 10,000. He says the tribe started thinking seriously about the project after it had trouble getting oil on the reservation during the 1973 Arab oil embargo. A physicist, he was hired in 1976.

The Half Moon plan is envisioned as the first link in an integrated network of small tidal projects located in Cobscook Bay and other places along the upper Maine coast where tides exceed 15 feet. Subsequent installations would be spared the high construction costs at Half Moon because of the experience gained and the environmental effects learned from this experiment, which would answer the research and development questions that have been raised for the past 40 years.

ALTHOUGH engineering studies will not be completed until September, Laberge theorizes that the harnessed 18-foot tides can be expected to generate electricity for 5.7 cents a kilowatt hour (kwh), a rate sim-

ilar to that presently set for small-scale hydro plants and competitive with oil- or coal-fired generating units. He says that in 1976, when power was worth 1.5 cents per kwh, Bangor Hydroelectric Company was not interested in purchasing the power. But now, 5.5 to 6 cents "seems to be reasonable, and something they can pay for tidal power and still make a profit on." Half Moon's chances of success also look better because of the new regulation requiring larger utilities such as Bangor Hydro to purchase power from small producers within their system. In fact, in New Hampshire, the public utilities are required to pay 7.7 cents for water power, a situation Laberge thinks the Maine Legislature will be debating during its next session.

While pointing out the marginal, if not negligible, immediate returns from the Half Moon Cove project, Laberge notes the importance of focusing on the long-term benefits derived from substituting nonrenewable sources of energy with renewable resources. He reflects that the region would today be paying less than 1 cent per kwh if the project had been completed in the 1930s, when construction was first started. That 1 cent represents an increase of less than .5 cent per kwh in the 40-year period because tidal waters, the source of "fuel," are free and "inflation proof," allowing the production cost of tidal power to remain relatively constant over time. Conventional sources, on the other hand, are subject to inflation and environmental and health concerns, such as air pollution and nuclear waste disposal.

On the theme of environmental impacts, Laberge admits the appropriate studies have not been done, although preliminary work shows what needs to be considered. Whereas high tide levels will not change significantly, a major change will be the rise in the natural low tide

level by eight to 10 feet: an additional 302 acres will be always underwater, resulting in a reduced intertidal zone. Some clam flats will be lost, Laberge says, adding that an average of four clambers work each tide, the maximum being 10 to 12 people. He marks this slight economic impact because Dexter Cooper's scheme ground to a halt in large part because years ago fishermen complained the project would destroy the large herring fishery.

As for other changes in the tidal basin, they won't be known until the pilot project is developed and tests can be conducted.

A few of the 50 landowners abutting the cove have expressed concerns as well, Laberge says. There are not many residences on the largely undeveloped shore, but one landowner at the northern end of the cove is unhappy that he will be unable to get his boat in from the larger Cobscook Bay to dry dock in the winter on his property. Such a landowner, Laberge notes, "might feel he's losing something, but instead of just tide flats in front of his house, there will be swimmable waters," which, from one point of view, will increase the recreational value of the cove.

AQUACULTURE and tourism also enter the picture. The tribe has had a marginally successful oyster culture operation within the cold water cove for the past few years. It is expected to improve (if the project is approved) because the temperature within the impoundment will rise. Also, a new road between Perry and Eastport will be built over the dam. Not only will tourists come to see the first tidal power plant in the United States, but the new highway will either eliminate or reduce traffic on Route 190, currently the only road into Eastport and a source of friction between locals and the tribe because it bisects the reservation. (In fact, the dam will replace the old toll bridge which was torn down in the 1950s and which used to be the only way onto Moose Island, where Eastport is situated. The bridge, in need of repairs, was discontinued in favor of the present causeway, which was already in place in the form of rock dams built as the initial step in the Quoddy Tidal Power Project of the late 1930s.)

The construction of these dams drastically altered the biological diversity of Half Moon Cove, which was previously fed by both Quoddy and Cobscook Bay waters. Now, only Cobscook Bay flows into the cove, where no commercial fishing, aside from clamming and marine worm digging, is done. Mostly for this reason, Laberge doesn't worry about environmental impacts, not even from dredging. The small-scale project, confined to the cove, is not expected to affect whales, which travel in Quoddy Bay, and eagles will be of concern only during the construction phase when their nesting and feeding activities may be disrupted.

THE 75-FOOT-HIGH rockfill dam, as planned, will be constructed across the cove entrance. At high tide, the gates will be closed, while waters outside the impoundment continue to recede according to the low tide cycle. When there is a sufficient head between the so-called high pool and the exterior bay—as much as 12 feet for maximum power production for the average tidal range of 18.1 feet—the water is released to generate electricity through two one-way turbines. Laberge says two-way turbines, which would allow power production when the pool is filling on the high tide cycle, cannot be economically justified. Turbines are half the project costs, and there would be only a small head of power when the tide is entering the pool, so less power would be produced.

The single-pool scheme from basin-to-sea produces power for six or seven hours. Because Half Moon would not be supplying continuous or baseload power, the area would still have to depend on Bangor Hydro and Eastern Maine Electric Cooperative for power.

Backed by a tidal power committee made up of seven communities bordering Cobscook Bay, the Half Moon Cove project is tied to at least five other possible impoundments of coves in the Cobscook region, which experiences the highest tidal fluctuation in Maine.

However, as Gary Dawbin of the State Office of Energy Resources points out, "It is only one of a potential 100 tidal power sites along the coast." Half Moon Cove, he says, may well be the largest of the small-scale projects built on the coast, and it may be the forerunner demonstrating the necessary technology, "but there are innumerable inlets with large volumes of water" which may prove suitable. Historically, Maine is thought to have had as many as 150 tidal power sites.

Sites at Vinalhaven, North Haven, Woolwich, Arrowsic, Kennebunk and Cutler are among those which have been investigated. Many once powered sawmills or gristmills. Ideal locations, Dawbin says, are those which, like the Vinalhaven site, present a large bay or cove with a narrow or shallow inlet, so that it is not necessary to build up the dike to get a high head. The deeper the water in the cove, the higher the dike must be and so the greater the cost.

In the last six or seven months, Dawbin says, the regional office of the U.S. Department of Energy has shown a greater interest in tidal power, and loan programs to stimulate low-head tidal projects may be in the works. He hopes to receive funding to hire someone to review topographic maps, some of which indicate where dams used to exist, and to travel the coast finding actual locations. Dawbin points out the technology for tidal power is almost a direct transfer from that for small-head hydroelectric plants on rivers, except for the reversible flow phenomenon.

by Lucy L. Martin

222

ENERGY SHORTAGES WILL SPUR QUODDY, DAM-MODEL BUILDER SAYS

Karlene K. Washburn
District Correspondent

EASTPORT — H. Noel Poirier, who in 1938 built the model for the Passamaquoddy tidal dam project, told an audience Tuesday night that he still believes the massive hydroelectric project, first talked about in 1919, will be constructed.

"We haven't seen the real depth of the energy shortage yet," predicted Poirier, who personally supports the two-pool, international plan.

The Army Corps of Engineers has in its latest studies shifted its emphasis to the feasibility of a smaller, U.S.-only project.

Poirier, who was in Eastport for the first time in 40 years, also said he considers the small tidal project proposed for Half Moon Cove by the Pleasant Point Indian Reservation will be "a remarkable start" in demonstrating that tidal power will work.

Through slides and a recording, the speaker described the different steps in the construction and workings of his model, which was commissioned by President Roosevelt in 1938 and exhibited at the World's Fair in New York 15 months later.

Although he had a background in drafting, sculpture and cabinet making, this was to be the largest model he had ever

made. Measuring 26 by 16 feet, and constructed of wood, it was scaled to represent 300 square miles.

Roosevelt assured him that all materials needed would be provided, recalled Poirier, telling his audience that the president was always an enthusiastic supporter of tidal power.

And so, with only 15 months to go, Poirier went to work, spending a week observing tidal patterns around Eastport, studying hydrographic maps of the region, and putting wooden panels in the water to get the actual feel of the tidal force.

Five young men were selected to work on the project, including John Cormier of Eastport, and the five, operating out of a building in Quoddy Village which was part of the National Youth Administration, learned to use tools and acquired electrical and plumbing skills. "Five very talented boys," Poirier remembers.

The Department of Agriculture provided a plane for aerial mapping in connection with the construction of the model, which used 600 gallons of water to demonstrate the tidal changes within the bay. Carefully designed layers of plywood were used to demonstrate the

shape and height of the topographical features depicted on the model.

The wooden model, Poirier said, is not to be confused with the concrete one constructed by the Army Corps of Engineers and housed in Quoddy Village. Poirier's was moveable and commissioned especially for the World's Fair, where 3 million people viewed it.

"Following the fair the model was displayed on the grounds of the Washington Monument," recalled its builder, the only public display up to that time allowed on the monument grounds.

"And Roosevelt sent word to the Congress that he expected them to come down and look at it," Poirier said. "He wanted to show the nation and the congressional body what the tidal project would mean."

With the advent of World War II, the president made arrangements for the model to be sent back to Eastport for safe keeping. Unfortunately it was not stored in a proper place, and ironically, was destroyed by water.

Poirier continued to work for 27 years with various bureaus in Washington. He constructed naval ship models at the Navy's David Taylor Model basin and also did the models for other government constructed dams, including Shasta Dam and Boulder.



OUTDOORS...

By BUD LEAVITT

BANGOR DAILY NEWS
BANGOR, ME.
B. 76-478

SEP 3 1980

New
England
Newspaper

5,646 took time to participate

While on leave to give the bones and scratches time to mend, the returns from Congressman David F. Emery's "sportsman's questionnaire" provided study-reading to go with the rocking chair beat.

Possibly, you recall an earlier dispatch here noting that Emery was in the throes of sampling opinion from the ranks of resident activists. The returns and the response to Emery's questionnaire clearly portrays the wide citizen interest on management matters involving resources and field sports.

Exactly 5,646 men and women took the time to complete and mail the questionnaire to Emery's Augusta office.

I know of no other mail sampling, of-hand, that has produced a bigger return on fewer than 10,000 inquiries.

IF DAVE Emery was truly seeking counsel to guide him on congressional matters affecting or regulating the Maine citizens's lifestyle, certainly he got a wind-fall full of wisdom in the questionnaire returns.

For instance:

93 percent favored mandatory prison sentences for crimes committed with a firearm.

49.4 p.c. opposed banning snowmobiles from national park property, 48.7 favoring.

63 p.c. oppose a ban on the use of leg hold traps, 31 p.c. favoring.

55.7 said they were satisfied with the way Maine industry and large land owners were managing their holdings and 56 percent indicated they were in favor of present handling of the public lots issue.

60.8 p.c. opposed the use of public subsidies for budworm spraying and 55.9 favored the use of chemicals for forest and farm use.

49.2 expressed dissatisfaction with the ban of lead shot for waterfowl hunting at Merrymeeting Bay, 42 p.c. supporting the use of steel load.

60.5 OPPOSED the expansion of mandatory steel shot to other Maine areas where waterfowl species are hunted.

61.6 supported the endangered species

legislation and 70 p.c. went on to claim endangered species laws are not too restrictive.

55.6 p.c. said they are willing to pay a higher tax to boost the Dingell-Johnson Fund.

72 p.c. favored protecting Alaska from over-development.

Here are a part of the yes or no choices to specific questions put to citizens in the Emery questionnaire:

Should congress vote against any attempt to increase the government's control over the private ownership of handguns?

(Yes: 3885; no, 1713.)

Do you support a federal law requiring registration of handguns?

(Yes, 1382; no, 4178).

DO YOU FAVOR a federal ban on manufacture or sale of the so-called Saturday Night Special?

(Yes: 3029; no 2348).

Do you believe the use of leg hold traps should be banned?

(Yes, 1743; no, 3569).

Are you in favor of protecting the wilderness areas of Alaska?

(Yes, 4070; no, 1216).

The matter of energy and specifically construction designed to promote additional hydro-electric power, produced an interesting cross-section of opinion.

The sampling asked for views on these proposals: Construction of Dickey-Lincoln on the St. John River, 3,531 opposed, 1,421 in favor; Pittston Oil Refinery at Eastport, 2,763 favoring, 1,843 opposed; Passamaquoddy Tidal Project, 4,068 in favor, 520 opposed; revitalization of hydro-electric projects on streams and rivers, 4,517 favoring, 477 in opposition.

The Atlantic salmon river and stream restoration program got a share of the attention.

Emery's questionnaire polled constituent-sportsmen for a viewpoint on the following: ban on the commercial sale of Atlantic salmon, 1579 favoring such action; ban on the interstate transportation of

salmon, 1135 in favor; a tagging system such as Canada's, 2358 favoring; an international treaty to control salmon catches, 3106; increased effort to improve spawning habitat, 4034.

EMERY'S post-survey report includes a footnote on problems encountered in the two federally-funded Atlantic salmon hatches at Craig Brook and Green Lake.

Frunculosis disease caused a drop in the production of smolts last year, he says, 20 to 30,000 with 135,000 being released last spring. He warns until new ultraviolet and filtration systems are installed, some 18 months hence, there is a possibility of further outbreaks of the disease.

The final report from the Emery questionnaire is available to the general public. Fire off a letter to Emery's Augusta office executive, George Smith, 46 Sewall St., and he'll make certain you get a report.

Excellent study report. The return from 5,646 Maine citizens clearly shows Maine outdoor folk want to know where they're going and what's down the road.

Bangor Daily News, Bangor, ME September 3, 1980
N-REFERENDUM SEEN BOOST TO TIDAL POWER PROJECT

By Dave Cheever

Of the NEWS Staff

EASTPORT— Normand Laberge has no complaints with the timing of the nuclear power referendum. In fact, the director of the Half Moon Cove Tidal Power Project thinks the vote and all the accompanying hooplah might do him some good.

"A vote to close Maine Yankee," he said, "could provide impetus to our tidal power project."

As matters stand now, though, Laberge might not need a threatened closure of the state's only nuclear power facility.

Results of a feasibility study conducted by the Charles T. Main engineering company of Boston are expected in October, and when Laberge gets them he plans to file for a tidal power project license with the Federal Energy Regulatory Commission.

Getting the license could take six to 12 months, Laberge estimated, and then construction could begin if financing is secured.

The brokerage firm of Tucker Anthony and R.L. Day has actively been involved in researching the project and scouting possibilities for bond sales, should they be desired to finance any part of the estimated \$25 million project.

Laberge said settlement at the federal level of the Maine Indian land-claims case could supply the Passamaquoddy tribe with "up front" money for the project. Using the money in any manner for Half Moon Cove tidal power development would have to be approved in a vote by the tribe.

The project itself is "looking better and better," said Laberge.

The basic plan calls for a single tidal pool, single turbine action generation. There would be two turbines, each accounting for approximately 4 megawatts of power in six-hour cycles.

As a pilot project, Half Moon Cove is envisioned by Laberge as perhaps demonstrating tidal power is feasible economically and environmentally. He contends the cove has some natural and man-made advantages.

"The transmission lines and roads into the site are already in place," he said. "That cuts down on construction costs."

He estimated that erecting transmission lines is a \$100,000-a-mile proposition.

The turbines envisioned for the project have been tested and can be manufactured in the United States.

"The technology isn't cheap," he said, "but it's getting there in relation to other power production methods."

The opportunity for additional research and development is considered a compelling reason for pursuing the project on a scale such as Half Moon Cove. There are only three other tidal power projects either on line or in production at this time. A small Russian project has been started, and a river-tidal combination in France has been on line for several years.

The only North American effort is Annapolis Royal in Nova Scotia—another river-tidal project Laberge said has little application for Half Moon Cove or Cobscook Bay.

The long-range plan devised by the Cobscook Bay Tidal Power Committee would utilize Half Moon

Cove paired with another tidal inlet or cove in the bay. Several sites are being researched for inclusion in such a plan. Pairing would allow for one tidal project to operate on the incoming tide, the other on the outgoing—thus producing constant power that could be used as a base supply rather than a peak supply.

Laberge estimated that there is sufficient tidal capacity in two small projects to handle all of Downeast Maine's power needs.

A larger project, which would work independently and not detract from the small paired operation, is the subject of a pending feasibility study by the U.S. Army Corps of Engineers.

Rather than the international project envisioned as far back as 1919 and partly acted upon in the 1930s, the Corps of Engineers has been asked to consider a project entirely within United States waters.

The preliminary figures show a capacity for 200 megawatts from the project, which would be expensive to build, said Laberge.

But he and others are viewing the tidal power potential with a long-range perspective. There never would be any fuel costs, comparatively incidental maintenance, and a constant return.

Eastport and Washington County would likely benefit from increased tourism and employment—ancillary developments with which the area has little quarrel.

Environmentally, the project is viewed by Laberge as a boon. Aquaculture, particularly the raising of oysters and mussels, would be one of the side benefits to tidal power.

Oysters now take five years to reach marketable

maturity. Because the temperature of the water in Half Moon Cove would be raised approximately two degrees, the growing time under monitored conditions could be reduced to three and a half years.

There is no waste to dispose of from the tidal power. There is no pollution anyone has discovered.

"I'm spending a lot of my time getting the environmental-impact material ready," Laberge said. "The research work has been going well."

Outside the normal amount of time it takes to review impact statements, Laberge is not viewing environmental concerns as threatening in any way to the project.

The crunch for Half Moon Cove is considered the economic question, and it is one that Laberge and his advisers think they might have little difficulty dealing with.

One influential broker said the feasibility study by Charles T. Main would be all that was needed.

"If the thing is feasible—or even close—it's going to go," he said.

The referendum, if it passes, is seen by Laberge as adding momentum to the tidal power proposal.

He estimates a legal battle could consume five years, easily, before the question of a forced closing of Maine Yankee could be resolved. He also has a timetable for Half Moon Cove: feasibility and license application in 1980, license in 1981, construction under way no later than 1982-83, and unit on-line by 1985.

"Perhaps an offshoot to the referendum's passing," he said, "would be to move a marginal project (such as Half Moon Cove at present) into a positive one."